

# THE MARINE REVIEW

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No. 3.

## ARMOR PLATE CONTRACT.

The navy department has divided the contracts for armor plate for the battleships South Carolina and Michigan between the three companies that contested, the Carnegie Steel Co., the Bethlehem Steel Co. and the Midvale Steel Co. The bid of the Midvale Steel Co. was from \$70 to \$95 a ton lower than those of the other two companies. It is given one-half the work to do and the other two companies get one-fourth each, but at the prices named in the Midvale Co.'s bid of \$346 per ton. In explanation of the division of the work, Secretary Bonaparte, of the navy department, issued the following statement.

"The bid of the Midvale Co. is the lowest not only in the aggregate, but for each one of the four classes. All of the bids, however, are lower than any price heretofore paid by the government, for the like armor, and lower, so far as the department is informed, than is paid by any foreign government. The department is advised that both the Carnegie and the Bethlehem companies will be completely out of work for their respective armor plants within a short time unless they obtain some portion of this contract, and that the plants in question will be unavoidably shut down and the force therein employed discharged and scattered in the contingency mentioned. This statement seems to be admitted as true by all parties interested.

"The contractual relations of the government with the Midvale company have been hitherto satisfactory, but some doubt has been entertained as to its ability to comply with its existing contracts, and it is in fact slightly behind the time originally fixed in its deliveries, although the evidence before the department does not justify the statement that it cannot comply with the terms of a contract to manufacture and deliver the whole of the armor in question, and it avers and offers to guarantee its ability so to do."

"The secretary of the navy is convinced that the best results would be attained in this case, and the most expeditious delivery of the armor in question would be secured if the contract were divided between the three bidders. It seems to him clear that it would be against public policy and the best interests of the naval service, and, more especially, would seriously affect the assurance of good results and expeditious delivery of materials under this particular contract, if the government were to find itself obliged to trust to a single armor plant to supply its needs, all American competitors having retired, at least temporarily, from the business, and the purchase of armor abroad or its manufacture by the government itself being at present forbidden by law.

## THEIR BIDS REDUCED.

"The Carnegie and Bethlehem companies are willing, and have offered to reduce their bids to that of the Midvale company, and to take at the prices there fixed by their competitor any portions of the contract which may be assigned to them, and it seems clear to the secretary of the navy that in the exercise of the discretion reposed in him by the act, it will be advisable to divide the said contract, assigning one-half thereof to the Midvale company, at its prices, and one-fourth thereof, at the same prices, to each of the two other companies; it being his judgment and belief that, to attain with certainty the best results and most expeditious delivery, the Midvale company should be properly assigned one-half of the contract, but no more, and if practicable at the same prices, the other half should be assigned to its two competitors."

## REACHES ITS DESTINATION.

The dry dock Dewey which started from Solomon's Island, Dec. 28 last, arrived at its destination at Olongapo on July 10. The dry dock was built by the Maryland Steel Co., Sparrow's

Point, Md. As soon as official confirmation had been received by the navy department of the safe arrival of the dry dock at its destination, Secretary Bonaparte cabled his congratulations to the officers in charge of this most extraordinary towing act. The towing of the structure through the Suez canal was under the supervision of the aged head pilot of the canal, Pappa. The old man was under medical attention two of the nights that the Dewey was in the canal. Com'dr Hosley who commanded the flotilla towing the Dewey, sent the old pilot a letter of appreciation and has recommended that some suitable trophy be given to him for his services by the navy department. The Dewey was convoyed by the colliers Brutus, Caesar, Glacier and the navy tug Potomac. The towing machines supplied by the American Ship Windlass Co. gave exceptional service. What with adverse winds and hard seas progress at times was limited to a knot an hour, but the great structure was at no time in any danger.

## STUYVESANT DOCK STRIKE SETTLED.

New Orleans, July 12, 1906.—The strike of the freight handlers on the Stuyvesant docks, which threatened for a while to tie up the entire river front of New Orleans, has been finally settled and the men went peacefully back to work this morning. They have accepted the compromise of the railroad company and will receive 18 cents an hour for ten hours' work, instead of 20 cents an hour for nine hours' work. At one time it was feared that all the other unions along the river front would be drawn into the controversy and that a serious tie-up of the shipping interests would result. The railroad company had 500 strike-breakers at hand ready to put to work but made no attempt to use them, refraining from doing so until absolutely sure there was no chance of securing an amicable adjustment of the differences.

### MERCHANT MARINE LEAGUE.

Mr. W. E. Lindblad, of Chicago, recently delivered an address on the subject of "Subsidizing our Merchant Marine" in which he stoutly defended the negative. Mr. A. R. Smith, the commissioner of the Merchant Marine League of the United States, entered into correspondence with Mr. Lindblad concerning his views with the result that Mr. Lindblad wrote to ask for any published data on the subject of our merchant marine. So convincing were the documentary arguments advanced by Mr. Smith that Mr. Lindblad wrote:

"Permit me to say that in future discussions on the matter in question I will be a staunch advocate for subsidies for I see now that my former stand was both narrow and limited."

Mr. Lindblad's oration was as follows:

#### SUBSIDIZING OUR MERCHANT MARINE.

The bill introduced in congress a short time ago, for subsidizing our merchant marine, or in other words, granting government bounties of millions of dollars annually to ship owners, as a stimulus to attract American capital to invest in that industry and build it up, presents a question of vital importance to the people of this country. In 1850, we had the largest merchant marine in the world, today, England's is seven times greater than ours, and even Germany leads us in the amount of yearly commerce she carries. At first thought this statement presents an alarming situation, and it is my purpose this evening to explain this situation, and to show you that not only is there no need for a larger merchant marine, but that owing to the rapid growth of our other industries, offering safer investments and larger returns, the building up of our merchant marine, by means of subsidies is an impossibility.

In 1865, when our merchant marine began its decline, congress passed a subsidy bill, and paid out twenty-one millions of dollars as subsidy money, and not only did it involve the members of one congress and two steamship lines, in corruption and bribery and scandal, but, our merchant marine declined every year. The commissioner of navigation tells us that during the period of time when we were subsidizing our merchant marine, there was never a time when we could not have purchased every ship in the ocean flying the American flag for one-third of this amount; so we see from our past experience, that subsidies have been a miserable failure. If it is urged that a large merchant marine will increase our commerce, I answer that since 1865 our merchant mar-

ine has steadily declined, while on the other hand, every year since 1865, has marked a large increase in our exports, thus demonstrating that our exports are governed by the wants of other nations—by the laws of supply and demand—and not by the size of our merchant marine.

It is said that a large merchant marine will give employment to thousands of Americans on the seas, and it is true that before the Civil War, thousands of Americans did find employment on the seas, because that was the only calling open to our people. But after the war conditions changed. The people turned to the west and planted beautiful cities, towering churches and factories and mills and mines. Subsidies to ship owners will not and never can attract Americans from the higher wages of the cities, the unlimited opportunities of the great golden west, from their homes and their people, to the perils and dangers of the sea—the lowest of callings—so it goes without saying that instead of giving employment to Americans subsidies will tax Americans, and divert employment to foreigners in foreign lands.

Nor will conservative American capital invest in an enterprise which is subject to the doubtful profits of the sea, when safe enterprises and unlimited new fields for capital, all paying a high and certain return are to be found in this country, therefore it is but natural that shipping should decline, because it has become unprofitable. Is it the part of wisdom for the government to attempt to revive an industry when both American capital and American labor are abandoning it?

The advocates of the measure picture the stars and stripes flying on all the seas, in an effort to win by an appeal to sentiment what they fail to win by logic. It seems the shallowest of patriotism, which would pay large sums of the public money for the vain glory of seeing the stars and stripes flying on the ships of the seas, manned by foreigners, when they do fly over one of the grandest navies on the seas, and when there is not a nation, not a city, not even an isle in the seas, of any importance, in which the stars and stripes are not known and honored and respected.

Finally, can the American people afford to spend millions upon millions of dollars for the sake of fostering a mere sentiment?

#### MR. SMITH'S REPLY.

Mr. Smith's reply was as follows:

My dear sir:—Thanks for your favor of the 21st, just received, also for the enclosed summary of your oration on "Subsidizing our Merchant Marine." The candor of your letter as to your doubts

as to your position, requires that, in reply, I should say to you that I have been an advocate of American shipping, and government aid therefor, for twenty-three years; that I have been a close student of almost everything bearing thereon during that time, having for ten years published a weekly marine newspaper, which I largely devoted to this advocacy. Naturally you will concede that I know something on the subject. As to whether my judgment is sound, that is for you to decide after what you will read below, and what you have opportunity to read in documents already mailed you, and which are illuminating and interesting on this subject—to be sure, however, from the point of view of the advocates. Representative Gilbert, of Kentucky, made a speech against the bill, as did Senator Mallory, of Florida, and I feel sure that each will be glad to send you complete copies of their speeches if you ask for them. Representative Goulden, of New York has more recently made a speech against the bill, largely a reproduction of his remarks published on pages 340 to 354 inclusive, in the document of the public hearings I mailed to you. I may add that at the age of 14 years, I began a seafaring career in 1875, which I followed intermittently for four years, and have all of my life since then been connected with maritime affairs.

Referring to your oration, first paragraph. You state that in 1850 we "had the largest merchant marine in the world." I have not at my hand the statistics of Great Britain's shipping for that year, but feel very sure that hers was greater than ours. I regard the closing sentence of your first paragraph as eminently unsound, and take direct issue with you, to wit: 1. We have the greatest need of a larger merchant marine. 2. Subsidies are not an impossibility, because other industries offer safer investments and larger returns. We have this need because a much greater merchant marine is essential to the national defense. In support to this I refer you to Appendixes A and B, pp. 33 to 49, of Senate document No. 10, 59th Congress, 1st session, mailed you today. I also refer you to Gen. Grosvenor's speech, and to pages 77 to 82, inclusive, thereof. Reading these over, with care, and reflecting upon them, I should think you would be convinced that your first assertion to which I object is as I assert, unsound.

I wish to say in parenthesis, that I make my objections with all due respect, with no intention of being unfair or offensive, and I am willing to

admit that I may be wrong, but I do not think that I am.

As to my other objection, I hold that many of our other industries, to the rapid growth of which, and the greater safety and profits they yield, as you correctly state, are and long have been the beneficiaries of the aid of our government through our protective tariff. It is the policy of this nation to protect all American industries that are subject to foreign competition against that competition in the home market, through the tariff. Withdraw the protection afforded by the tariff, averaging fully 45 per cent of the value of our dutiable imports, and there would be, in my judgment, a cessation of growth, the investments therein would be as unsafe and as unprofitable as is investment in our foreign-going shipping. On the other hand, apply to our shipping in the foreign trade equal protection to that enjoyed by our other industries that are subject to foreign competition, and its growth would be as rapid, and investment therein as safe and profitable as in any other industry in the United states. You may know that American registry is denied to foreign-built American-owned vessels, and you may regard this as highly protective. The fallacy of such a view lies in the fact that it is not protective at all, for the reason that under our laws foreign ships in our ports enjoy every privilege that our own enjoy, in our foreign trade. With foreign ships permitted to compete for our foreign carrying in our ports upon terms of perfect equality with our own, the denial of our registry to a foreign-built American-owned ship is practically valueless. The American may freely invest in these foreign-built ships, and his investment is safe under other flags. He is not handicapped, in short, by the denial of American registry to such ships; and he has said so. I refer you to pages 64 to 66 House of Representatives document No. 4136, 58th Congress, 3rd session. You may think that our great industries have become profitable, that they grow and are safe despite the protection—the high protection—of the tariff, but I do not. At any rate, those with money invested in shipping, and those with money ready to invest therein, say that if equal protection is given to our shipping to that enjoyed by our other industries, they will take the risk of investing their capital therein, and the chance of their investment being safe and profitable.

You infer, in the opening of your second paragraph, that the decline of our merchant marine began in 1865,

whereas it began in 1861. It (that in the foreign trade, and it is to this I am confining my remarks and comparisons) reached its zenith in 1861. Will you refer me to the report of the commissioner of navigation that you quote, or rather refer to, in the second sentence of your second paragraph. It may be the report of 1894, made by the present commissioner, who has since repudiated, and offered facts to show that he was in error, in almost every statement made therein. If it be true that, owing to loose administrative methods, or possibly looseness in the drawing of the act, or corruption and bribery in securing its enactment, the law was a failure, that need not and should not condemn the policy as vicious and bad. Great Britain has been subsidizing her shipping ever since 1839—sixty-seven years. To be sure it is only her mail lines that are subsidized, but what an important part of her marine her mail lines are! Has her subsidizing been attended with scandal? Note the terms of the latest British subsidy, pp. 96 to 108, Gen. Grosvenor's speech, where Great Britain lends the Cunard line \$13,000,000 with which to build two steamships, the loan to run for 20 years at 2¾ per cent interest, the government during the same time paying in admiralty subvention \$750,000 and in mail subsidy \$340,000, a total of \$1,090,000 a year for twenty years to the line. Note what Mr. Blaine said to Mr. Gladstone, quoted in Mr. Goulder's speech on "Our Commerce," before the American Bankers' Association,—page 3, mailed you with miscellaneous documents. Despite the fact that our commerce has grown since 1865 and our shipping has declined, that does not prove that our foreign trade would not be stimulated by the establishment of new lines, and an increase in our cargo-carrying tonnage. Grant what you say as to the law of supply and demand, cannot the latter be stimulated if the facilities of transportation are increased and cheapened? That is what we believe the advent of an American-built, a government-aided merchant marine would accomplish; the betterment and the cheapening of ocean transportation.

As to your third paragraph: Out of 79,913 men shipped through our United States shipping commissioners in 1896 Americans numbered 23,142, or 29 per cent. It has steadily increased, so that in 1905 of 120,635 seamen so shipped, Americans numbered 59,609, or 49 per cent. The number has more than doubled in ten years. Doesn't that prove that you are entirely mistaken? If such a growth can occur with condi-

tions so uninviting, as to the hardships of the trade of the sea, and the steady shrinking of our tonnage, what shall we say will occur with the growth of our shipping stimulated, and made prosperous and profitable?

As to your fourth paragraph: Only three years ago, or four years ago, a syndicate of which J. Pierpont Morgan was the head, invested \$170,000,000 in shipping. Perhaps a majority of the capital was foreign—but I doubt it. The syndicate was American, the company was incorporated under the laws of New Jersey, and it owns 130 steamships, of about a million gross tons' register—the largest shipping company in the world. But 10 of the 130 steamships are American, to be sure. Read the agreement in Gen. Grosvenor's speech, pp. 94 to 96, made between this American corporation, composed largely of British companies, to be sure, with the British government, and then ask yourself why such British solicitude for the registry of those steamships, why the requirement that the officers and a proportion of the crews to be named by the government, shall be and remain British for twenty years? Surely, not that Americans may not secure possession of unprofitable shipping? You would not say that their concern for us goes that far? But, supposing our shipping had been protected to the same extent that our other industries that are subject to foreign competition, that \$170,000,000 would have all gone into American ships, unquestionably—and a great deal more. Why, we have just made a careful investigation, and find that about 75 steamships, aggregating about 400,000 gross tons, and to cost about \$40,000,000, would be immediately ordered in American ship yards if the pending shipping bill is passed—a new shipping nearly one-half as large as we now have in the foreign trade, and more than that, as to efficiency—a steam shipping two-thirds as large as we now have in the foreign trade under our flag.

Possibly you will not care if I omit any serious discussion of your fifth paragraph. You will note in the pending shipping bill, a copy of which I have mailed you, that a certain increasing proportion of the crews shall be American citizens.

And, as to your last short paragraph: I ask you to pause and reflect upon the sums this country has spent perhaps not in "fostering" but at least in deference to "mere sentiment." Just think about that, and then thank God that sentiment is so powerful and sways so large a proportion of our people.

Now, the foregoing is a long letter,

but I ask that you read it over at least a couple of times. Since I have taken the pains to write it (and it has been a pleasure) it deserves at your hands "the most careful consideration." And then I shall be pleased to receive your views thereon.

Would you mind showing this letter to Mr. Soper?

Your sincerely,

A. R. SMITH.

#### WORK AT SOUTHWEST PASS.

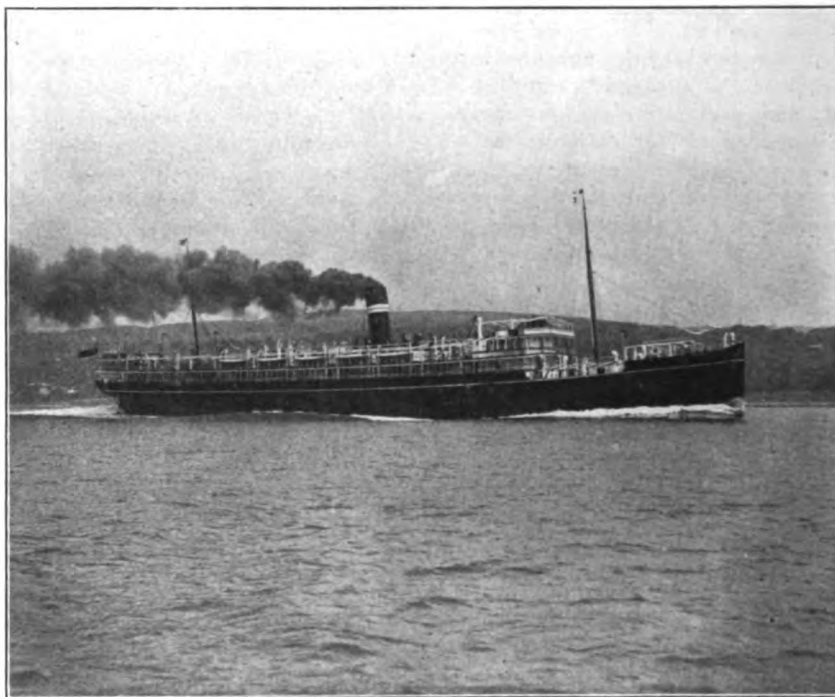
New Orleans, July 12, 1906.—Government engineers in charge of the improvement work at Southwest Pass want \$1,000,000 to carry the work through the fiscal year which will close June 30, 1908, and in the annual report which has been forwarded to Washington, state that unless congress appropriates this amount it will be necessary to suspend operations until sufficient funds are made available. Already more than \$2,000,000 has been spent on the vast improvement work and it is estimated that considerably over that amount will be necessary to make the Pass what the original plans provided it should be. Many statistics are embodied in the report which was submitted by Lieut. Col. Clinton B. Sears, the officer in charge of this division, and from these it is shown what has been done and what remains to be accomplished. The following table tells the greater part of the story:

|                                                                                                                                  |                |
|----------------------------------------------------------------------------------------------------------------------------------|----------------|
| Total amount expended to June 30, 1906.....                                                                                      | \$2,001,893.35 |
| Balance unexpended July 1, 1905.....                                                                                             | 1,642,822.56   |
| Amount appropriated by Sundry Civil Act Approved June 30, 1906..                                                                 | 500,000.00     |
| Total .....                                                                                                                      | \$2,142,822.56 |
| Amount expended during last fiscal year....                                                                                      | \$1,004,647.14 |
| Transferred to fund for Maintenance of South Pass .....                                                                          | 23,305.33      |
| Total .....                                                                                                                      | \$1,027,952.47 |
| Balance unexpended July 1, 1906.....                                                                                             | \$1,114,870.09 |
| Outstanding liabilities July 1, 1906.....                                                                                        | 197,492.18     |
| Balance available July 1, 1906 .....                                                                                             | 917,377.91     |
| Amount covered by uncompleted contracts...                                                                                       | 693,174.03     |
| Amount (estimated) required for completion of existing project....                                                               | 2,500,000.00   |
| Amount that can be profitably expended in the fiscal year ending June 30, 1908, in addition to balance unexpended July 1, 1906.. | 1,000,000.00   |

These statistics show simply the amount of money represented by the large works which will give to the port of New Orleans an entrance pass that will admit the largest vessels afloat.

It is proposed to establish in Southwest Pass a channel 35 ft. deep at mean low water, and 1,000 ft. wide, the whole to cost something over \$6,000,000. So far a great part of the work has been done and there is already a 15-ft. channel through the pass which will admit of the operation of vessels drawing 15 ft. of water and less. This channel is something like 650 ft. in width. The contract for the two jetties was

was a depth of 10 ft. of water. When operations were renewed in December, 1905, the depth had been reduced to 9 ft. At the close of last month, as a result of the operations of the dredge, there was a 15-ft. channel, 650 ft. wide, through the pass and the central depth of this channel was 16 ft. Farther up the channel had also yielded to the little work done and was forming along the prescribed channel line.



TURBINE STEAMER REWA.

awarded to Christie & Lowe, of Chicago in July, 1903. The laying of the foundation mats in the east jetty began Dec. 31, 1903, and in the west jetty Aug. 30, 1904. To June 30 of this year the east jetty has been extended out from the shore end a distance of 21,700 ft., while 16,148 ft. of the west jetty had been constructed. The following mats of various sizes were used:

East jetty—113 foundation mats; 75 second-tier, 65 third-tier, 52 fourth-tier and 32 fifth-tier mats.

West jetty—81 foundation mats, 50 second-tier, 38 third-tier, 34 fourth-tier and 22 fifth-tier mats.

All of these had been placed and secured by the required amount of stone and the contractors had completed, according to the terms of their contract, 989,033 square yards of mattress work, held in place by 212,354.31 tons of stone. They had also placed 29,728.49 tons of stone in the east jetty and 17,146.86 tons in the west jetty. This latter will form the foundation under the concrete superstructure and is also for the sea ends of the jetties.

The report shows that when the dredge Barnard began operations on the outer bar about June 1, 1905, there

No estimate of the time necessary to complete the great work was furnished by Col. Sears but it is understood that it is now more than half done. Other matters were touched upon in the report and among other things it was asked that the appropriation for the maintenance of South Pass be increased from \$100,000 to \$150,000 per annum. It was also stated that the work on the Plaquemine locks was progressing satisfactorily and \$10,000 was asked for the Bayou Teche improvement work.

The expenditures of the engineer's office here during the last fiscal year, \$1,317,718.41.

#### TURBINE STEAMER REWA.

The new turbine steamer Rewa, launched from the Leven ship yard, for the British India Steam Navigation Co., is the ninety-fifth vessel, and the fifth turbine-propelled steamer which Messrs. Denny & Brothers have built for these owners. The principal dimensions are: Length, 445 ft.; breadth, 56 ft.; depth, 32 ft. 9 in. While primarily designed for passenger and mail service, the arrangements of the vessel are such as to render her particularly suitable for trans-



port work. The captain and officers will be accommodated in a central house on the top of the boat deck, conveniently situated with reference to the navigating bridge. The boat deck, which extends from the front of the bridge right to the stern of the vessel, provides a large promenade for the use of the passengers. The bridge deck, situated below the boat deck, is of the same extent, and has at its forward end a large deckhouse containing first-class music room and vestibule.

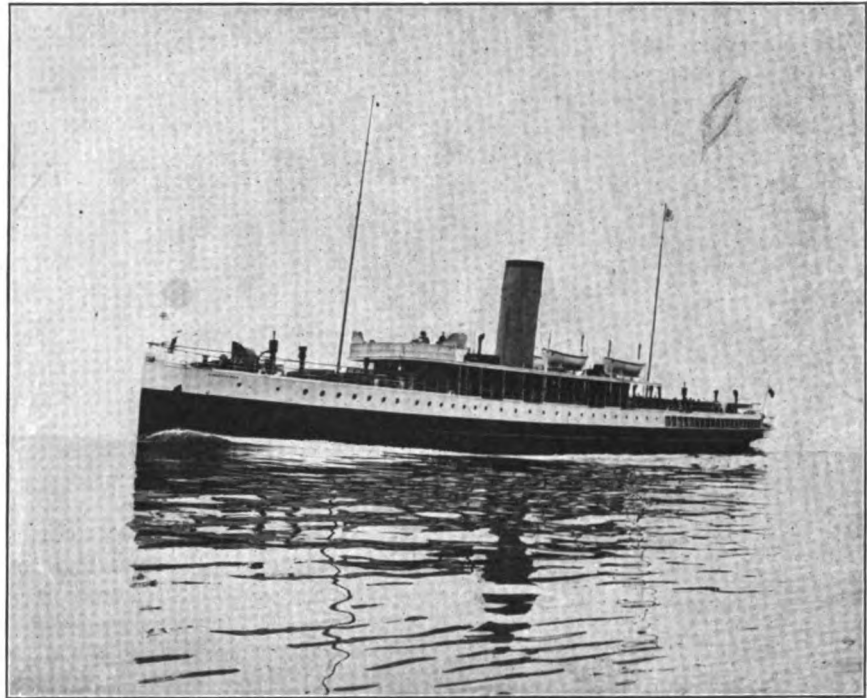
The vessel will be lighted throughout by electricity, the installation being by the builders. A dry-air refrigerating plant is to be installed abaft the engine room, with wine rooms, meat rooms, vegetable lockers, and freezing rooms, thus insuring an ample supply of fresh provisions, regardless of the climate in which the vessel may be engaged. The ventilation, which has been made a special feature in the vessel, is to be by steam-driven fans in the troop spaces and by electrically-driven fans in the first and second-class passengers' quarters. Two separate steam steering engines are to be provided, one gear actuating a right and left-handed screw connected to the crosshead, and the other the quadrant through chains. Dobbie's patent rudder brakes are to be fitted in addition to relieving tackles, so that in the event of any one method of steering breaking down there are always two alternate methods held in reserve. A "Clayton" disinfecting and fire extinguishing plant will be installed, in addition to which there will be steam connections to the holds and pressure water service on deck. The cargo gear will consist of hydraulic cranes, two of which are to be fitted to each hatchway. The propelling machinery will consist of three independent steam turbines of the Parsons type, which, together with the boilers, are being constructed by Messrs. Denny & Co., engineers, Dumbarton.

#### TURBINE STEAMER KINGFISHER.

The latest addition to the fleet of swift turbine steamers, the Kingfisher, went on her official trip off the Firth of Clyde recently. She was built by Messrs. William Denny & Bros., Leven ship yard, Dumbarton, to the order of the General Steam Navigation Co., London, and will be the first turbine propelled steamer to take up service on the river Thames. On her builder's trial she attained a maximum of 21.43 knots. This is considerably in excess of the guarantee and gave great satisfaction to owners and builders alike. The dimensions of the steamer are: 275 ft. by 32 ft. by 10 ft. 9 in., and her machinery will consist of three independent Parsons compound steam turbines, and two condensers, being one high-pressure and two low-pres-

sure turbines, with which latter the reversing turbines are incorporated. The speed aimed at is 20 knots, and the reversing power is intended to be such as to make the vessel capable of easy handling. There are four decks. The boat deck in the center will form a fine promenade for the passengers, as well as a shelter for the midship

is a bow rudder, with hand gear, for use in backing out of port. A complete electric installation will also be fitted by the builders. Only one class of passengers is to be carried, and the accommodations and furnishings throughout are therefore of superior style. The Kingfisher will be certificated for service to Boulogne and other



TURBINE STEAMER KINGFISHER.

section of the deck below in wet weather. The promenade deck extends almost the whole length, and is fitted with buoyant seats, while the erections consist of the captain's cabin, deckhouse containing lounge, and the entrances to dining saloon and tea room. The dining saloon, which is situated aft on the main deck, is a spacious compartment, and will be handsomely fitted. It will provide accommodation for over 130 people, and will be framed in polished oak, and treated in a free classic manner. Forward of that will be up-to-date lavatory and other accommodation on the port side, and pantry, bar, etc., opposite. The engine room hatch will be quite open, and surrounded by rails, so that the passengers can see the machinery. Forward of the boiler room is the culinary department, and still further forward is the ladies' cloak room and lounge, which is also in oak. On the lower deck aft, are quarters for officers and crew, two refrigerating chambers for provisions and wines, while forward is a spacious tea room, seated for between 60 and 70 people, and more crew accommodation. Steam gear is fitted for the aft rudder, which is of the builders' usual balanced type, and there

continental ports, and she will no doubt be greatly taken advantage of by the pleasure-seekers of the metropolis. The propelling machinery, together with the boilers are being constructed by Messrs. Denny & Co., engineers, Dumbarton.

#### SHIP BUILDING ON THE CLYDE.

Glasgow, July 10.—In the matter of ship building June has been altogether an exceptional month. It has seen launched a larger tonnage of new vessels than any previous month on record. This in itself is a fact which is of no particular significance, says the *Herald*, so far as the trade is concerned. It is the natural result of the coincidence that the Cunard liner *Lusitania* and the battleship *Agamemnon*, building at neighboring yards, and also a large number of the merchant steamers for which orders were placed in the "boom" near the end of last year, all happened to reach the launching stage within the same month. The moral may be drawn from the placing of the contracts; it certainly cannot be drawn from the launching of the vessels, although the tonnage has now materialized and run up to such a high figure that one month

seems to have produced as much as three usually do. As a matter of fact the huge Clyde output of 36 vessels of 124,544 tons is not an encouraging sign for the immediate future. It shows that the "boom" is being worked off, that is all. If it were accompanied by an improvement in the general ship building trade and the placing of orders for additional vessels it would be very gratifying. But it is not. Freights continue very poor, the prices of ship building materials are unchanged, and contracts are few and far between. The yards where first-class vessels are built have been scarce of work for some time back, and at the present moment they could easily find berths for a good many new vessels. The revival of last year was purely a cargo steamer revival, and, even at that, was unwarranted by trade conditions.

The production of the half-year all over Scotland is shown in the following table:

|         | Clyde.  |         | Forth. |       | Tay.  |        | Dee.  |       |
|---------|---------|---------|--------|-------|-------|--------|-------|-------|
|         | Ves.    | Tons.   | Ves.   | Tons. | Ves.  | Tons.  | Ves.  | Tons. |
| Jan. 15 | 31,162  | 2       | 2,440  | 1     | 1,700 | 5      | 1,046 |       |
| Feb. 18 | 38,893  | 2       | 650    | 1     | 1,160 | 2      | 285   |       |
| Mar. 26 | 58,478  | 3       | 850    | 1     | 300   | 5      | 676   |       |
| Apr. 19 | 31,657  | 4       | 2,540  | 3     | 4,600 | 7      | 830   |       |
| May 36  | 51,524  | 1       | 100    | 2     | 2,300 | 7      | 1,224 |       |
| June 36 | 124,544 | 1       | 200    | 2     | 1,950 | 9      | 1,380 |       |
|         | 149     | 336,258 | 13     | 6,780 | 10    | 12,010 | 35    | 5,441 |

The Clyde totals for a series of years follow:

|           | June.   | Six Months. |
|-----------|---------|-------------|
|           | Tons.   | Tons.       |
| 1906..... | 124,544 | 336,258     |
| 1905..... | 39,620  | 234,736     |
| 1904..... | 25,877  | 187,363     |
| 1903..... | 28,049  | 187,706     |
| 1902..... | 39,206  | 236,000     |
| 1901..... | 44,909  | 232,073     |
| 1900..... | 57,988  | 214,904     |
| 1899..... | 36,105  | 233,155     |
| 1898..... | 47,862  | 207,538     |
| 1897..... | 29,243  | 149,254     |
| 1896..... | 27,660  | 194,243     |

#### ANSWER TO THE PICAYUNE.

Mr. Harvey D. Goulder, president of the Merchant Marine League of the United States, has written the following letter to the New Orleans *Picayune* in answer to an editorial in the *Picayune*:

Editor *Picayune*:—In the last sentence of your editorial on "The Ship Subsidy Grab," in your esteemed issue of the third, you say:

"If we cannot compete with the rest of the world on equal terms, no amount of artificial legislation in the way of bounties and subsidies will remedy the matter."

Doubtless you think so, too. But I wonder if you would think just the same thought were it a matter of abolishing the 65 or 70 per cent duty on sugar, or the 100 per cent duty on rice, the exaction of which on imported rice and sugar being regarded as extremely helpful to the planters of Louisiana? Do you think that the planters in Louisiana, engaged in raising rice and sugar, would feel indiffer-

ent about the "artificial legislation," if that is what it is called, that enables them to obtain nearly twice as much for their products, in this country, as they would do if there were no duty on competing foreign products?

Whatever justifies the existence of the protection that your sugar and rice producers enjoy, might, upon careful analysis, justify the application of a reasonable and necessary protection for our ships in the foreign trade.

You are eager for the free admission of foreign-built ships to American registry, notwithstanding the fact that all of the American owners of such foreign-built vessels as are now engaged in our foreign trade say that they would not, if they could, place those vessels under our register. Besides, knowing that American officers and crews receive higher wages than the officers and crews of foreign ships receive, you would "repeal the restrictive shipping laws" which you think are a bar to the operation of vessels under our flag in our foreign trade at a profit.

Now, why raise sugar and rice in Louisiana, if the cost there is higher than in foreign countries, the West Indies for instance—Cuba, for example?

The conditions in this country do not admit of raising the products named, in free trade competition with foreign countries, hence the protection. Perhaps you know this to be so, and will admit it? We know that the same is true of ships—both in the building and the operation, besides the disadvantage (which is very serious) of the foreign subsidies and bounties that the foreign ships enjoy that compete with our own. It is thought well to encourage the production of rice and sugar in this country—why not encourage the building and operation of ships, also? It is thought well to protect the producers of rice and sugar—why not protect the builders and owners of ships?

The publication of this letter is respectfully requested.

(signed) HARVEY D. GOULDER,  
President.

A new steamship line to operate between Mediterranean ports and New York, is reported in progress of organization. To this end a new steamer has been ordered in the yards of John Priestman, Sunderland, England, to cost \$425,000. The new steamer will be 400 ft. long, 50 ft. wide and 29 ft. high and will ply between such ports as Zymra, Patres and Naples.

James Pollock has been appointed harbor master of the port of Philadelphia.

#### CRUISER MILWAUKEE.

The protected cruiser Milwaukee, built at the Union Iron Works, has just come off of the dry dock at Hunter's Point. This vessel is soon to have her builder's trial on the San Francisco bay under the immediate command of Capt. George Harvey, of the Pacific Mail Steamship Co. At this preliminary trial the new war vessel is expected to acquit herself with credit. As soon thereafter as practicable the Milwaukee will proceed to Santa Barbara channel for her final trial before being accepted by the government. The vessel will also then be under command of Capt. Geo. Harvey, and a selected crew. However, the final crucial trial will not take place until the return to San Francisco of the naval board that will direct matters at the trial of the new battleship Nebraska that was constructed at the Moran Bros. Co.'s yard at Seattle, Wash. The Milwaukee is required to develop a speed of 22 knots an hour.

#### BARGE CANAL CONTRACTS.

The barge canal advisory board has awarded three new contracts for barge canal work which will, if approved by the state canal board, entail an expenditure of over \$3,000,000. One leads to the formation of a permanent lake ten miles long and a quarter of a mile wide in Albany county, as the result of dams at Crescent and Vischer's ferry. This work will cost \$1,413,000. The second contract calls for the construction of two movable locks and dams at Tribes Hill and Amsterdam on the Mohawk at an estimated cost of \$870,000. The third contract provides for canal, bridge and highway work and a guard lock between Lockport and Tonawanda. This work will cost \$1,077,000.

The navy department has awarded contract for the two 16,000-ton battleships South Carolina and Michigan, one going to the Cramps of Philadelphia and the other to the New York Ship Building Co., of Camden, N. J. The Cramps' bid was \$3,540,000 and that of the New York Ship Building Co., \$3,585,000. Congress has provided that not more than one contract should be given to one company.

Mr. A. L. Craig, recently appointed passenger traffic manager of the Northern railway, has been made general passenger agent of the Great Northern Steamship Co., also.

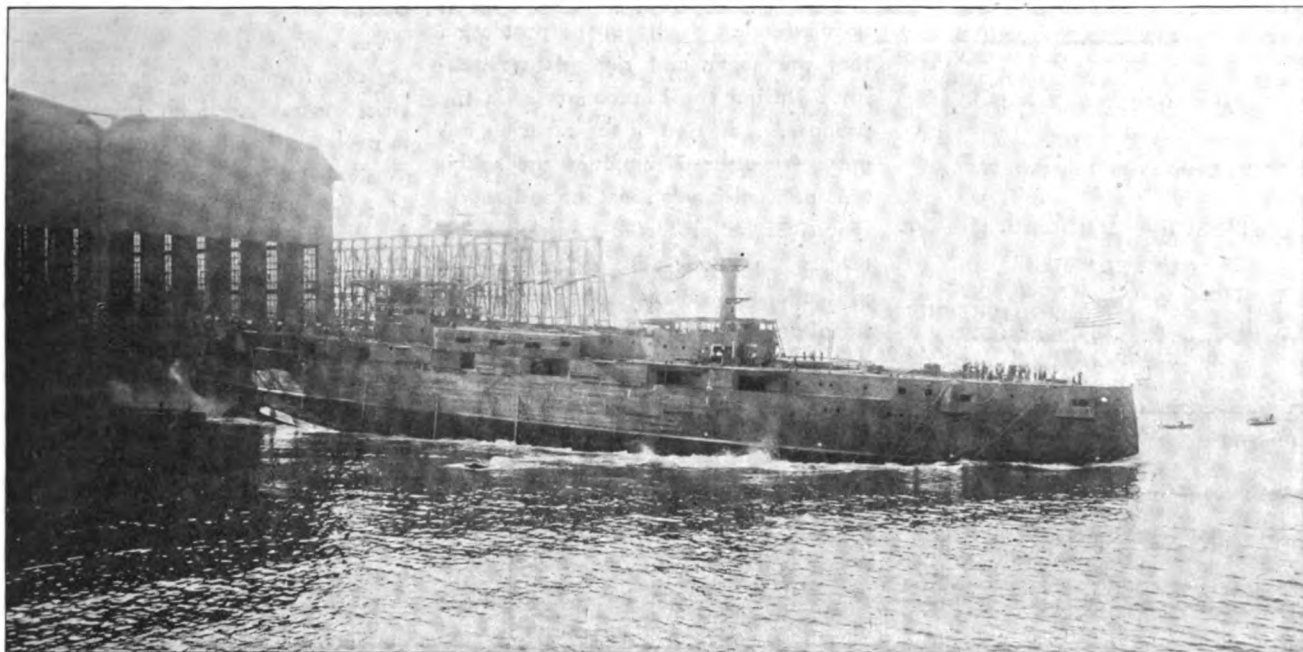
The Kawasaki Ship Building Co., of Japan, has received an order from the Chinese government to build six second-class gunboats and four torpedo boats.

## ITEMS OF GENERAL INTEREST.

The Oceanic Steamship Co. has failed to pay the July semi-annual interest of 2½ per cent on \$2,405,000 bonds.

is at present in New York, says that the company is prepared to build six Atlantic liners to add to its present fleet. The new steamers are to be fast but will not be equipped with turbines.

on the great lakes either by England or the United States. This is one of the questions pending between the United States and Great Britain and which was submitted to the High Joint Commission.



LAUNCHING THE BATTLESHIP NEW HAMPSHIRE AT THE NEW YORK SHIP BUILDING CO.'S YARD.

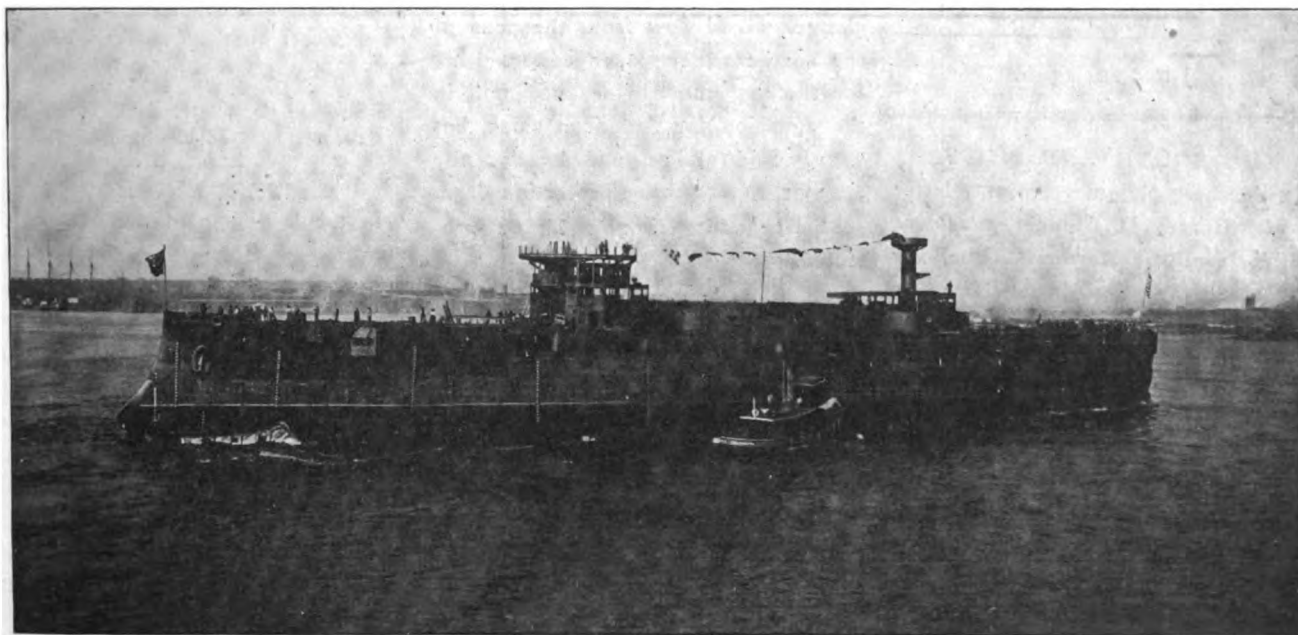
*For description see Marine Review July 5.*

Ake, Noecker & Ake, East Camden, N. J., launched last week a sea-going barge, 196 ft. long, for the Easton & McMahon Transportation Co.

Among the things that are held in abeyance in the navy department is the construction of a naval training ship on the great lakes. More than a year ago pro-

The commission adjourned, however, without settling it.

Frederick H. Mason, Detroit, Mich., has become the representative for the



BATTLESHIP NEW HAMPSHIRE IMMEDIATELY AFTER THE LAUNCHING.

Hugh Kelly, identified for half a century with the Chicago grain trade, is dead at the age of seventy-three years. Mr. Kelly was one of the early members of the board of trade of Chicago.

Bruce Ismay, president of the International Mercantile Marine Co., who

vision was made for building such a ship, the intention being to have it used for the naval militia of the states bordering on the lakes. The question was then projected as to whether the building of such a ship would not interfere with the agreement with Great Britain which provides that war vessels shall not be constructed

Alphons Custodis Chimney Construction Co. for the state of Michigan. He still continues as sales agent in that territory for the well known Cochrane feed water heaters, Sorge Cochrane purifying system and Cochrane separators.



DEVOTED TO EVERYTHING AND EVERY  
INTEREST CONNECTED OR ASSOCIATED  
WITH MARINE MATTERS ON THE  
FACE OF THE EARTH.

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### THE SOUTH AND SHIPS.

In another column we print a letter by Mr. Harvey D. Goulder, president of the Merchant Marine League, answering a point raised in the New Orleans *Picayune*, in one of the latter's periodical attacks upon the ship subsidy bill. Let the pending bill become a law, and three or four new American steamship lines be established running from New Orleans to Cuba, Mexico, Panama, and to Brazil, as the bill provides, and it is our judgment that the *Picayune* would look upon the matter of subsidies in a very different light from what it now does. Considering what the bill offers to Gulf ports—more than to any other section of the country, in the way of new American steamship lines—the persistent opposition of New Orleans newspapers is the more inexplicable, since in the development of new lines from Gulf

ports, doubtless New Orleans would secure the lion's share.

When it comes to a revision of the tariff, Louisiana's senators and representatives are keenly alert to see that no diminution occurs in the protection that the sugar and rice planters enjoy. During the last congress, in the proposed reduction in the tariff on imports from the Philippines the solicitude of Louisiana's senators and representatives for protected Louisiana's interests was noticeably manifest. Let protection be abandoned as the national policy, or withdraw it from sugar and rice, in response to the free trade theories of Louisiana's leading newspapers, and the result would be extremely disastrous to Louisianians.

Doubtless the *Picayune* thinks the shipping industry is sufficiently remote from its immediate circle of readers to cause them to pass by, with indifference, the attempt of those interested in shipping to secure proper protection, or the opposition to that advocacy, which New Orleans newspapers indulge in. Let some northern newspapers, however, inveigh against the duty on sugar and rice, and what a howl of "sectionalism" and other charges would flow from the pens of the southern newspaper editors who, for the moment, can see no good in the agitation for American ships, but who would realize, and keenly, any attempt to withdraw protection from southern industries now highly protected.

### FOG AND PASSING SIGNALS.

So prevalent has fog been on the lakes during the present summer that the subject of adding to the fog signals has been suggested to the steamboat inspection service. The law requires a steamer to blow three blasts of the whistle every minute when navigating during a fog, but the steamer has no fog signal to indicate that she has a tow. What is therefore desired is a fog signal for tows that cannot readily be mistaken for some other signal. It has been suggested that a steamer with a tow blow three blasts and then a short one every minute, thereby indicating her tow by the short blast. Objection has been raised to this signal on the ground that it may be mistaken

for an assistance signal, which is four blasts. Of course, at the present time the tow barge is required to continue to sound the bell during a fog, but naturally the bell sound does not penetrate like a whistle.

Vessel owners are uniformly directing the attention of their masters to the strict observance of the rules for safety in navigation on the lakes. Especial emphasis has been put upon the necessity of acknowledging passing signals. The reason that the passing signal is so frequently ignored by the other vessel is doubtless that her course is too obvious to be announced. Notwithstanding obvious intention, however, it were better for every vessel to acknowledge passing signals, for should anything unforeseen happen, it leads to distressing complications. When a vessel blows a passing signal which is not acknowledged, she is supposed then to sound an alarm. Should anything happen, the fact that she did not sound an alarm signal might be brought in evidence against her; and yet in a great majority of cases to sound an alarm signal merely because the passing signal was not acknowledged, would be absurd. The straight way out of the difficulty is to see that passing signals are invariably exchanged. The number of accidents on the lakes can be materially reduced by a strict observance of the rules of navigation. No owner wants his master to take chances.

### MASTERS AND MATES.

In the last issue of the MARINE REVIEW a competitive course in self-instruction by the question method was started for wheelmen and watchmen. It will be noted that a similar course for masters and mates is beginning in the present issue. The MARINE REVIEW hopes that masters and mates and wheelmen and watchmen generally will enter into the competitive contest. Prizes are offered merely to lend additional interest to the competition, but of course it is understood that the real value of the contest is its great self-educational feature. The questions will be so arranged as to prepare anyone for advancement aboard ship. While it must be taken for granted, of course, that masters already possess the necessary knowledge, still it will do them good to have it furbished. It is hoped



that a lively interest will be taken in the competition by the forward end of the boat.

### QUESTIONS FOR MASTERS AND MATES.

The MARINE REVIEW opens this week a course of self-instruction for masters and mates by the question method under the direction of Mr. Clarence E. Long. It is understood that this course is entirely independent of the lessons in lake navigation now running in the MARINE REVIEW by Mr. Long. Masters and mates are invited to mail their answers to these questions to the MARINE REVIEW. Each answer will be personally examined by Mr. Long and the percentage noted upon it. At the close of the season the four holding the highest percentages will be given bonuses in the sum of \$50, \$25, \$15 and \$10 in gold. The chief merit of this question method lies in the fact that it is self-instructive. It is hoped that masters and mates will generally enter into the competition. Following is the first list of questions:

Ques. 1. What is the difference between NNE  $\frac{1}{2}$  E and NE by N  $\frac{1}{2}$  N?

Ques. 2. You have corrected your chart course for variation and deviation and you find the compass course to be ENE  $\frac{3}{4}$  E. What course would you give the wheelsman to steer; that is, how would you read the compass to him?

Ques. 3. For practical purposes how much is 3 degrees equal to in fractional points of the compass?

Ques. 4. How many 3-point courses are there, and what are they?

Ques. 5. Why is it that the variation of the compass is the same on every point of the compass at the same place, no matter in which direction the ship may be heading, but the deviation is different for different headings of the ship, yet the ship practically remains in the same locality?

Ques. 6. What is the lubber's point of the compass; what does it represent and what is it used for, and where is it located?

Ques. 7. How many degrees in  $1\frac{1}{4}$  points?

Ques. 8. How do you know there are  $11\frac{1}{4}$  degrees in one point of the compass?

Ques. 9. If your boat made 22 miles in 1 hour and 25 minutes, how fast is she running per hour?

Ques. 10. How do you know that  $11\frac{1}{2}$  statute miles equals 10 knots?

Ques. 11. You are steering S  $\frac{1}{4}$  W and when you pick up Wind Pt. light you are heading for it; you are ten miles from it and you wish to pass two miles outside of it, what course must you steer in order to do so?

Ques. 12. Which way do you move on

the compass card to go westerly from south; which way would you move to go easterly from south?

Ques. 13. A boat steaming at the rate of 11 knots per hour steams how many knots in 7 hours and 30 minutes? How long will it take a boat that steams 11 statute miles per hour to cover the same distance?

Ques. 14. With the Sault canal ranges over stern your compass reads W  $\frac{1}{2}$  S; how much is the deviation of the compass; what point of the compass is this deviation for, and what course would you have to steer by this compass to cover the course given on the chart between Eagle harbor and Devils island? The true course printed on the chart between those points is WSW  $\frac{7}{8}$  W.

Ques. 15. You have steered N by E  $\frac{1}{4}$  E from Chicago to Pt. Betsey, but when you reached the latter place you are 14 miles off the point instead of four miles; how much is your compass out of the way, and which way, easterly or westerly, and what course should you have steered to have made good this course and be off the required four miles?

Ques. 16. The true bearing through the Sturgeon Bay ship canal is NW  $\frac{1}{8}$  W, the variation is  $2\frac{1}{4}$  degrees easterly; how should you head going through the canal if your compass was right, that is, free from deviation; supposing that when you went through the canal your compass read NW  $\frac{1}{4}$  N, how much is the variation and which way is it?

Ques. 17. You can steer N by E  $\frac{1}{2}$  E and make the course good between Chicago and Pt. Betsey; how much deviation has your compass on this course and which way is it?

Ques. 18. Define true course, correct magnetic course and compass course. Tell which is each and how you get or find them.

Ques. 19. Starting from East on the compass where will 2 points easterly fetch you?

### QUESTIONS FOR WHEELSMEN AND WATCHMEN NO. 2.

Below is appended the second list of questions for wheelmen and watchmen. The particulars of this question course were published in last week's issue of the REVIEW. Prizes will be given to the four holding the highest percentages of correct answers.

Give all shoals and principal landmarks passed on either hand.

In taking courses to make good the magnetic course, you should take mean variation from point of departure to point of destination.

16. Give course and distance from Oswego to Cape Vincent.

17. Give course and distance from Oswego to Nine Mile Point.

18. How would you navigate a boat from Nine Mile Point to Kingston?

19. Give course and distance from Oswego to Sacketts' Harbor.

20. Give course and distance from Oswego to Big Sodus.

21. Give course and distance from a point 2 miles N Big Sodus to Cape Vincent.

22. Give course and distance from a point 3 miles NE of Genesee Lt. to Nine Mile Pt.

23. Give course and distance from a point 4 miles N Port Dalhousie Lt. to Oswego.

24. Give course and distance from a point 4 miles N Port Dalhousie Lt. to a point 4 miles S of False Ducks Lt.

25. Give course and distance from a point 4 miles S of False Ducks Lt. to Cape Vincent.

26. Give course and distance from a point 4 miles S of False Ducks Lt. to Nine Mile Pt.

27. Give course and distance from a point 4 miles N of Pt. Dalhousie Lt. to Toronto Range Lts. easterly entrance.

28. Give course and distance from a point 4 miles N of Pt. Dalhousie Lt. to a point 1 mile S of Pt. Oshawa Lt.

29. Steamer having stern on Mamjuda Ranges, compass heading N  $6^{\circ}$  E, what would be the correct compass course of this steamer from Oswego to Nine Mile Pt. with same compass and same trim?

30. Steamer having stern on Mamjuda Ranges, compass heading N  $9^{\circ}$  E, what would be the correct compass course of this steamer from Fairhaven to a point  $4\frac{1}{2}$  miles E of False Ducks Lt. with same compass and same trim?

31. Give mean variation from Pt. Dalhousie to False Ducks Lt.

### COAL UNLOADING RECORD BROKEN.

On June 26, 1906, when the Hawgood steamer H. B. Smith, commanded by Capt. Balfour, was unloaded at the Winter street (Superior, Wis.) dock of the North Western Fuel Co., a new record for the quick discharge of a cargo of soft coal at the head of the lakes was established. The cargo of 10,376 tons of soft coal was taken out by the four "Brownhoist" rigs with  $1\frac{1}{2}$  ton Brown grab buckets and only one operator to each rig in nineteen (19) hours' actual working time, which makes an average of 546 tons per hour, or  $136\frac{1}{2}$  tons per rig per hour. For ten hours, out of the nineteen, there was a heavy rain and terrific wind which broke plate glass windows, blew down chimneys, and blew the boat 15 ft. out from the dock. Even with these unfavorable conditions for five hours, each rig took out 150 tons per hour.

\*Abbreviations—Lt., light.—S, south.

### CONTRACTS FOR LAKE STEAMERS.

Mr. Harry Coulby, of the Pittsburgh Steamship Co., placed orders for four steamers of the largest dimensions yesterday, three with the American Ship Building Co., of Cleveland, and one with the Great Lakes Engineering Works, of Detroit. These four steamers will be duplicates of the J. Pierpont Morgan and H. H. Rogers. They will therefore be 600 ft. over all, 580 ft. keel, 58 ft. beam and 32 ft. deep. In general design they do not differ from the Wm. E. Corey and the E. H. Gary. While they will have two feet more beam than the Gary, the cargo hold at the base will be the same width as the Gary, that is, 36 ft. The space from the sides of the hopper to the skin of the ship will be 11 ft. The sides of the hopper will be straight up to a distance of nine feet above the tank top, when it will be joined to the skin of the ship by an incline construction. The system of arch girder construction will be followed, leaving the hold absolutely unobstructed for operation of the unloading machines. While the new steamers will have a beam of 58 ft., the actual reach over which the unloading machines will have to extend is only 47 ft., making the distance to be traversed by the arm of the machine even less than it is in some of the older types of boats of smaller maximum beam. The new steamers will have thirty-six hatches, spaced 12-ft. centers. Their engines will be 24, 39 and 65 in. cylinder diameters by 42-in. stroke, supplied with steam from two Scotch boilers, 15 ft. 4½ in. diameters by 11 ft. 6 in. long, equipped with Ellis & Eaves draft and allowed 170 lbs. pressure.

The American Ship Building Co. has also closed contract with Pickands, Mather & Co., of Cleveland, for a new steamer to be 552 ft. over all, 532 ft. keel, 58 ft. beam and 31 ft. deep. It will be noted that this steamer has 2 ft. more beam than the ships of that length that the American Ship Building Co. has hitherto built. The new steamer will have triple-expansion engines with cylinders 23, 38 and 63 in. cylinder diameters by 42-in. stroke, supplied with steam from two Scotch boilers, 14½ ft. diameter and 11½ ft. long, fitted with Ellis & Eaves draft and allowed 180 lbs. pressure.

Mr. Charles O. Jenkins, of Cleveland, also closed contract with the American Ship Building Co. this week for a steel steamer to be a duplicate of the Charles S. Hebard, of the Wilson fleet. The new steamer will be 524 ft. over all, 504 ft. keel, 54 ft. beam and

30 ft. deep. Her engines will be triple-expansion with cylinders 23½, 38 and 63 in. diameters by 42-in. stroke. Steam will be supplied by two Scotch boilers, 14½ ft. diameter and 11½ ft. long. This makes eighteen contracts that the American Ship Building Co. has under order for 1907 delivery.

The Toledo Ship Building Co., Toledo, O., closed contracts last week with L. C. Smith and H. S. Wilkinson, of Syracuse, N. Y., for two freighters. The size of the ships has not yet been determined upon, but they belong to the class that carries between 8,000 and 9,000 tons. When these two new steamers are added to the present fleet operated by the United States Transportation Co. and the Lyman C. Smith Transit Co., Messrs. Smith and Wilkinson will have a fleet of eighteen steel steamers. The Toledo Ship Building Co. now has contracts on its books for four steamers, one of them, which has been sold to Mr. G. A. Tomlinson, to come out this fall, and the other three to come out next spring.

### FREIGHT SITUATION.

Those who predicted a movement of 38,000,000 tons of ore during the present season have had to shade their figures somewhat. Doubtless shippers would like a maximum movement of 38,000,000 tons, but it will have to move faster than it has been moving so far this year if the 38,000,000-ton figure is to be reached. Numerous causes have contributed to delay the movement of ore. Owing to the scarcity of cars and other reasons it has not been possible to work the mines to their full capacity and on the lakes long continued thick weather has seriously interfered with the free movement of the boats. Whether 6,000,000 tons will be brought down the lakes this month is still a problem. The movement will have to exceed 6,000,000 tons for the next two or three months if the total movement is to reach 38,000,000 tons. A more conservative estimate on the total shipments for the season is now placed at 36,000,000 tons. It may indeed be a shade under 36,000,000.

The freight market was never in better shape than now. There is abundant work for all vessels. Ore and coal, however, have such a fair monopoly that many vessels are not free to secure the grain trade. This was a matter of indifference to vessel men while the grain rate was a shade lower than the ore rate, but this week two cents has been offered on flax, which is equivalent to about 80 cents on ore. Some of the vessel owners are so loaded with coal contracts that they

have been trying to shift a part of them upon others—with little success, however, as all the owners are pledged to carry about all the coal they want to. The general condition, however, makes for firmness in the market. The lake trade was never sounder than now, everyone seemingly getting his part of it. Lumber tonnage is in good demand at \$2.25.

### AT THE HEAD OF THE LAKES.

Duluth, July 16, 1906.—The grain movement during the past week has not been heavy, but the establishment of a 2-cent rate to Buffalo has made the boat situation in grain a little easier. The receipts and shipments of grain from the head of the lakes for the weeks ending July 7 and July 14 are given as usual.

|          | Receipts. |         | Shipments. |         |
|----------|-----------|---------|------------|---------|
|          | July 7    | July 14 | July 7     | July 14 |
| Wheat    | 254,004   | 226,218 | 327,510    | 813,163 |
| Corn     | 8,416     | 23,276  | ....       | ....    |
| Oats     | 367,724   | 397,654 | 377,461    | 353,406 |
| Barley   | 92,442    | 153,672 | 30,039     | 200     |
| Rye      | 884       | 3,123   | ....       | ....    |
| Flaxseed | 313,810   | 432,282 | 141,462    | 331,197 |

As will be noted the receipts of every grain except wheat increased materially, flaxseed showing an increase of nearly 120,000 bushels. Wheat was easily the most notable shipment, the more attractive rate being responsible for the carrying of 500,000 bushels more than during the preceding week.

The ore shipments do not show up as well as might be expected owing to a falling off at both the Missabe and Allouez docks. The shipments at Duluth the past week were 68,488 tons less than in the preceding seven days and 77,326 tons less than the corresponding week last year. A couple of bad days with the boats was said to be responsible. The figures for the week are: Two Harbors, 323,801; Duluth, 289,069; Superior, 181,310; making a total for the period of seven days of 794,180 tons. For the corresponding week of last year the shipments were: Two Harbors, 301,007; Duluth, 365,621; Superior, 192,293 tons. In this comparison the showing at the Missabe docks this week is very noticeable, as the total shipment this week was slow as compared with last year's shipment of 858,921 tons. The ore movement to date this season has been 9,184,787 tons as against 8,543,392 tons last year, which indicates a falling off in the increase for this year of 64,741 tons, so that the docks are only 661,395 tons ahead at this writing.

The Stanley G. I. Manufacturing Co., Pittsfield, Mass., has just issued bulletin No. 149 descriptive of polyphase induction motors in small sizes. The bulletin describes the motors minutely and may be had for the asking.

**CAPT. EDWARD SULLIVAN.**

Capt. Edward Sullivan has been appointed master of the steamer Edward Y. Townsend, building at the Superior yard of the American Ship Building Co. for the Cambria Steel Co. Capt.



CAPT. EDWARD SULLIVAN.

Sullivan has been master of the steamer Leonard C. Hanna since she came out, but will turn her over to Capt. M. Anderson at the conclusion of the present trip. He will then go to Superior to superintend the construction of the Townsend, which will probably come out during the latter part of August.

**NAVIGATION WITH SAFETY IN THICK WEATHER.**

BY FRANK WATKINS.

Apart from the risk of collision, the next source of danger is stranding. If your compasses are reliable and adjusted down to the minimum of deviation with an accurate log you should know your ship's position at any time to a mile, but as so many discrepancies creep into the calculations as a means of readily "confirming" the ship's position for verification with the chart, recourse must be had to soundings. All government charts are marked accurately with the depth of water and character of bottom; especially at, or near turning points, or entrances to channels. Devices of various kinds are on the market but the only ones for competent use are those that enable a captain to get a sounding with a sample of the bottom every few minutes and this without stopping his vessel or altering the course. The reason is obvious. Lord Kelvin devised a sounding apparatus that for years has been in use in the American, British and other naval and merchant services which is capable of getting soundings in 100 fathoms of water with a vessel

speed of 20 miles an hour. Until recently this apparatus was only designed for salt-water use—but during the past year has been adapted for use in fresh water. Lake navigators familiar with that genius of a navigator the late Capt. S. T. Lecky—through his "Wrinkles" will clearly understand the principle and capabilities of the Kelvin machine, and its imitators but for those who have missed the treat of reading "Wrinkles" the writer describes herewith briefly.

The deck machine consists of an easy-running ball-bearing winch, upon which is wound 300 fathoms of tested seven-stranded galvanized fine wire. The depth recorder is either a glass tube sealed at one end and coated internally with a chemical compound that discolors by contact with water; or a metal piston which records the pressure or weight of water in fathoms. The former is generally used, because in case of an accident the loss is slight but the latter is the cheaper for a number of soundings as it is simply reset for each cast. The sinker is a 30-lb. iron weighted rod, above which on the wire is attached the depth recorder. The deck machine is set up about 12 ft. from the taff-rail upon which is a fairlead, giving the wire a clear lead over the stern. Having the sounding portion all ready hanging over the stern the officer stands with a finger-pin and gives the order—let go. As the wire rushes out the officer lays the finger-pin on the running out wire, and when bottom is reached he feels the strain released for a moment, and then signals the winch operator to put on brake which is done by one turn of the handle in the direction of winding in. The wire is wound in, and the chemical glass tube taken from its brass shield and placed in the fathom scale, and the depth read off; or in case the metal depth recorder has been used read the indicator and reset same for next cast. It is immaterial what angle the wire made or how much ran out. The sinker is now examined for the character of the bottom. This together with the recorded depth is telephoned or sent along to the bridge, and all made ready for the signal for another sounding. This operation takes from five to 15 minutes in depth of water 15 to 100 fathoms.

Supposing you are steering from Presque Isle over to Detour (the anxious course in thick weather) NW by N  $\frac{1}{2}$  N. When you have run 35 miles take soundings every one, two or three miles as judgment dictates, keeping your course: lay the sound-

ings off to scale on a piece of paper or celluloid, noting the character of bottom: now move the paper about on the chart in the parallel direction of your course until you find a place that agrees with your record—your officer is furnishing you every mile or two, other soundings to verify with certainty the previous ones—so you get your position with accuracy until within range of fog signal, etc. This is the procedure used upon the ocean, and is almost infallible; indeed the Atlantic liners could not keep their schedule sailings without its use; and the insurance people would need to raise their rates on such vessel risks were it not used.

On the great lakes the rivers are the chief source of danger but a captain needs some relief from anxiety in apparently open water; and it is a surprise that this aid to safe navigation has up to now not been used—if for no other reason than he may get rested from anxiety, and be in condition on deck for the next—narrow spot.

**OBITUARY.**

Capt. James Brown, probably one of the oldest steamship captains sailing out of the port of New Orleans, died at his home in that city several days ago. He was a native of Cork, Ireland, 61 years of age and came to America when he was fourteen years of age. As a lieutenant on the Confederate ram Manassas he attained distinction and after leaving the service of the Confederate states he became a master on a Morgan line vessel. He served that company for thirty-five years and then became one of the masters in the fleet of the United Fruit Co. Capt. Brown left a widow, one son and a daughter.

Capt. Charles A. Scheuermann, a well known towboat owner of Mobile, died at his home June 29 as the result of an overdose of morphine, taken by mistake. He had been suffering intense pain, the result of a recent attack of appendicitis, and getting out of his bed took what he believed to be a small dose of morphine. The dose was entirely too large and killed him a few hours later. Capt. Scheuermann was widely known throughout this section and the news of his death has been received with general regret.

**PERSONALS.**

Carlton E. Ladd announces that the law firm of Titus & Ladd having been dissolved, he has formed a copartnership with Mr. Frederick O. Bissell under the firm name of Bissell & Ladd for the general practice of law, with offices at No. 26 and 27 Dun building, 110 Pearl street, Buffalo, N. Y.

## AROUND THE GREAT LAKES.

The steamer Wm. A. Rogers had to be lightered in order to get over the Lime Kiln crossing on her last trip.

The steamer Daniel J. Morrell, building for the Cambria Steel Co., will be launched at Bay City, August 15.

Mr. A. A. Schantz, general manager of the Detroit & Cleveland line, was married to Miss Lili Mae Rankin at Detroit last week.

The steamer Samuel Mather, building for Pickands, Mather & Co., of

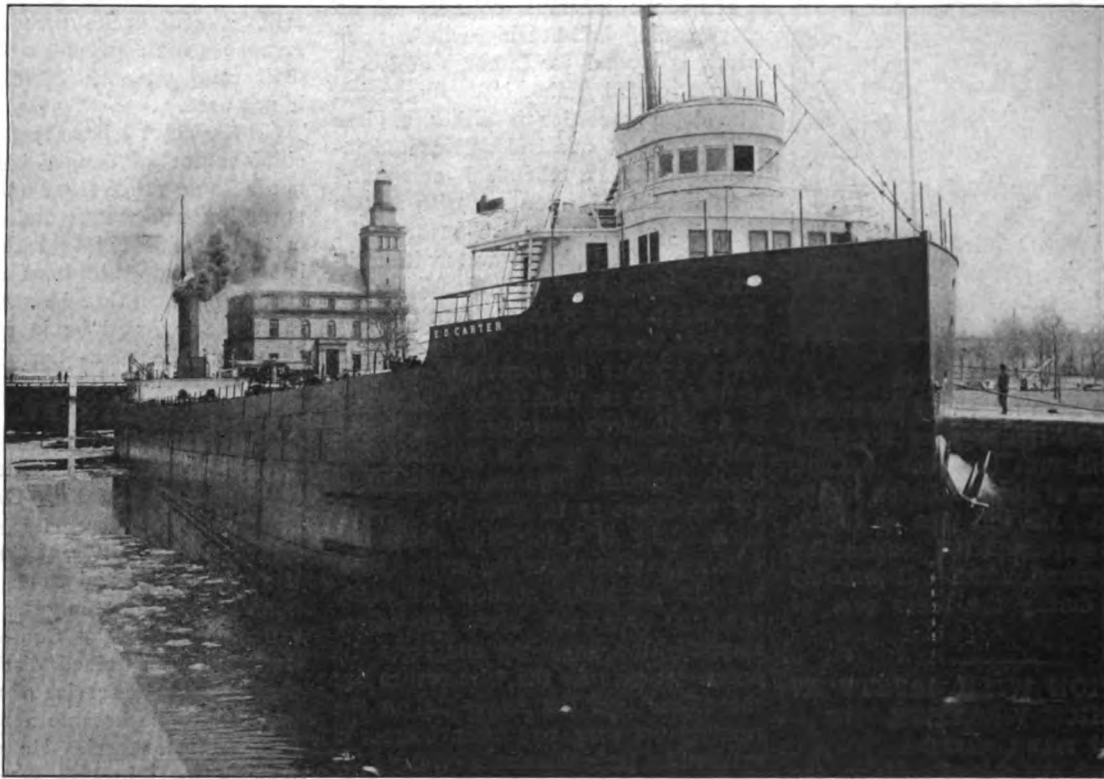
Pooley wants damages for injuries he claims were received on board the North West.

The tug Shaun Rhue, of the Dunbar & Sullivan fleet filled with water and capsized in the Detroit river a short distance above Duff & Gatfield's office last week. It is supposed that she struck a rock.

The steamer Bulgaria which was wrecked some time ago off Washington, Green Bay, and abandoned by her owner, James Corrigan, to the insur-

The steamer W. H. Gratwick of the Graham & Morton line left Chicago for Duluth last week with the largest shipment of binding twine ever carried from Chicago, consisting of nearly 2,000 tons, and is intended for distribution among the farmers of the wheat raising region of western Canada.

Mr. Eugene E. Haskell, of the lake survey, who was recently chosen dean of the engineering department at Cornell university, has been further honored by an appointment as a member



FREIGHT STEAMER E. D. CARTER.

The freight steamer E. D. Carter is 524 ft. over all, 504 ft. beam and 30 ft. deep. She has thirty hatches, spaced 12-ft. centers. Her engines are triple-expansion, with cylinders 22½, 36 and 60 in. diameters by 42 in. stroke, supplied with steam from two Scotch boilers, 13 ft. 9 in. by 11 ft. 6 in., equipped with Ellis & Eaves draft and allowed 180 lbs. pressure. She was built for Mr. E. D. Carter, of Erie, Pa., at the Wyandotte yard of the American Ship Building Co.

Cleveland, will be launched from the Wyandotte yard of the American Ship Building Co., on August 28.

The steamer Wm. G. Mather carried 10,013 gross tons of ore from Ashland. While the Mather is only 513 ft. keel length, she is, owing to her wide beam, 60 ft., safely in the 10,000-ton class.

The statement made in the last issue of the REVIEW that the third lock at the Sault would cost \$10,000,000 was a palpable mistake. The estimates of the engineers are about \$3,000,000.

The steamer Wm. G. Mather cleared from Marquette last week with 9,991 tons of ore from the Presque Isle dock. This was the Mather's first visit to Marquette and is the largest cargo ever carried from that port.

The steamer North West was seized on a libel for \$2,000 made by James Pooley but later was released on bond.

ance companies, has been sold to Capt. Isabel, Sturgeon Bay, Wis.

Charles Dobey, engineer of the tug, James Horn, Buffalo, was fearfully scalded aboard his tug this week by a green hand turning the wrong handle. The tug was headed about and Dobey was taken to Riverside hospital.

The Wellman-Seaver-Morgan Co., of Cleveland, has received an order for five of the Hulett 10-ton automatic ore unloaders for the United States Steel Corporation's new plant at Indiana Harbor, Ind. The machines are to be operated electrically.

The Great Lakes Dredge & Dock Co. has been awarded contract for work in constructing the new harbor at Gary, Ind., which is to be founded by the United States Steel Corporation. It is understood that the work will aggregate in value \$1,500,000.

of the international waterways commission to succeed Mr. George Y. Wisner, deceased. The appointment was made by President Roosevelt.

On Sunday night the barge Antrim, Capt. Edward Lohr, left for the lower lakes after having lain outside the Duluth harbor for four days. The Antrim was towed outside of the canal to await the John Sherwin which was to tow her down, and in dropping her anchor let it down into the wreck of the Thomas Wilson which was sunk four years ago. The anchor became entangled and the steamer had to proceed without the barge. Diver W. E. Hoy, of the Union Towing & Wrecking Co., went down, and under his direction tugs pulled the anchor free. The sunken boat in which the anchor was caught lies about one-half mile outside of the entrance and a little to the south of the canal.



The steamer Michigan, belonging to the Cleveland-Cliffs Iron Co., went into commission on Saturday last.

The car ferry steamer Marquette & Bessemer No. 2 is in dry dock at Cleveland.

The machinery of the steamer Oscar Flint became disabled while the steamer was at Kelley's island and she was towed to Detroit for repairs.

Pentwater harbor is to be dredged to 16 ft. The Fitzsimmons Co. is now engaged in removing the sand bar

The Lorain Coal & Dock Co. has given an order to the American Ship Building Co. for a new steel fuel scow 180 ft. long.

The barge Yukon which has been lying almost directly off the harbor entrance at Ashtabula since Oct. 20 last, has been removed by the Zimmerman. A drag over the spot afterwards showed nothing left of the wreck.

The old Clark dry dock property at the foot of Clark avenue, Detroit,

because other witnesses testified that the lights of the schooner were burning plainly.

It will be September before the steel barge Manila leaves the yard of the Toledo Ship Building Co. The job is one of the biggest repair jobs ever undertaken at a lake yard. Nearly five hundred men have been working on her for the past month.

Col. Charles E. L. B. Davis, Major David DuB. Gaillard and Major Wm. V. Judson have been appointed as a



PACKAGE FREIGHTER DELAWARE.

The package freighter Delaware is 370 ft. over all, 350 ft. keel, 50 ft. beam and 30 ft. deep. She has quadruple-expansion engines, with cylinders 19, 27, 40 and 58 in. diameters by 42 in. stroke, supplied with steam from two Scotch boilers, 13 ft. 9 in. by 11 ft. 6 in., allowed 210 lbs. pressure. She was built by the Great Lakes Engineering Works, Detroit, for the Erie & Western Transit Co., of Buffalo.

which for years has blocked the harbor entrance.

As for dredging in Black river, Port Huron, to overcome constant shoaling in the river between the Grand Trunk bridge and Washington avenue, an appropriation of \$10,000 is asked.

Bids for dredging Shoal 28 in Mud lake, St. Mary's river, were opened in Detroit last week. The lowest bidder was G. H. Breyman & Bro., of Toledo, at 25 cents a yard.

The steamer Anna Minch, bound down with iron ore, stranded on the west side of the St. Mary's river at the foot of the dyke. She was released with her rudder twisted and her shoe gone.

Mr. Frank B. Chesebrough, Emerson, Mich., has purchased the wooden steamer Madagascar and will send her to the coast. The Madagascar, which was built at Bay City in 1894, is 244 ft. long, 37 ft. beam and 21 ft. deep.

owned by the Detroit Ship Building Co., is being filled in to the dock line. In former years this yard was actively operated and turned out the steamers John Eddy, W. J. Averill, Promise, and others.

Capt. C. H. Westcott, supervising inspector of vessels for the Detroit district, upheld the finding of the local inspector of Chicago in revoking the license of Delwin Fisher, the pilot in charge of the City of Chicago, which collided with the steamer Harry Coulby on May 2. The charge against Fisher is that after signaling to pass the Coulby to port he blew an alarm whistle and still keeping his boat at full speed, put his wheel to starboard and attempted to cross the bows of the Coulby. He pleaded that the action was necessary in the presence on the port side of his boat of a schooner which he had not previously noticed. The plea was regarded as insufficient

board to make an examination and survey of Duluth-Superior harbor with a view to determining what, if any, modifications are required to the present plan of improvement.

The first court action in connection with the loss of the steamer Erin and five of her crew in the St. Clair river, May 31, through the collision with the steamer John B. Cowle, has been taken in the United States court at Toledo. The owners of the Cowle had filed a limitation of libel giving all who have claims against the Cowle until Sept. 17 to file such documents. The Cowle's petition avers that when the lights of the Erin were sighted on the morning of May 31 the helm of the Cowle was put hard astarboard. The Cowle blew two blasts to which the Erin responded, but the petition alleges that the Erin failed to direct her course in accordance with her signal. The petition charges the Erin

with not maintaining the proper look-out and with failure to starboard the wheel sufficiently to clear the down-bound boat.

The schooner *Olga*, which President Edward Smith, of the Great Lakes Towing Co., bought at marshal's sale at Tonawanda last week, will be used as a lighter at Buffalo in place of the *Active*. The *Active* will be stripped and the McMyler machine and clamshell will be installed on the *Olga*.

The docks and terminals at the Texas City Co., Texas City, Tex., which were promoted by Capt. A. B. Wolvin and associates, have been sold to a syndicate of New York and Pittsburgh men. Nothing is known of the new company beyond the fact that Charles M. Schwab is connected with it.

The steamer *Eugene Zimmerman* which was sunk in collision with the steamer *Saxona* in St. Mary's river on April 14, was floated from the dry dock last week. Her bow from the collision bulkhead forward had to be practically rebuilt, making an expensive repair job.

The Pittsburgh Steamship Co. has acquired a parcel of land at Erie on the water front. No definite plans have been formulated for its development, but it is known that the company wintered a great many of its vessels there last year and made considerable repairs upon them with its own men. There is some talk that it will put in a machine shop to facilitate this work.

Another coasting steamship has come from the Atlantic side to ply in the North Pacific trade, probably between Puget Sound and southeastern Alaska. This vessel is the *Saratoga*, recently purchased by the Northwestern Steamship Co., of Seattle. The *Saratoga* has just arrived at San Francisco—59 days out from New York. She came under command of Capt. A. A. Moore. The *Saratoga* was formerly in the New York and Cuba service. She was built in 1878 by John Roach, Chester, Pa., and has a net tonnage of 1,973, with a length of 298 feet; width of 38½ ft. and depth of 23.5 ft. The *Saratoga* brought 800 tons of cement for San Francisco. The vessel will shortly sail for Seattle which will probably hereafter be her home port.

A.T. Moffatt, at one time one of the best known tug and vessel owners on the lakes, died at his home in Oakland, Cal., last week. He was formerly president and manager of the Moffatt Tug line and the Star line of passenger steamers.

### MIXING OF ORE.

Duluth, July 18. — Considerable interest has existed in the matter of mixing ore at the head of the lakes and delays in loading especially at the Missabe docks have not been understood because of lack of information concerning that feature of the ore handling. Some mixing, it is true, is done at the other docks where one or two "groups" may be handled as at Two Harbors, but on the whole it is a distinctive feature of the Duluth docks. The greater extent to which "mixing" is carried on here is due not so much to the fact that more ore is shipped from here than from any other dock, as to the fact that the ores from the open pit Mesabi mines run much less uniformly in analysis than the ores from any other mines. At the Missabe docks practically every boat is loaded with a "mixed" cargo, which should not be confused with the divided cargo that may consist of two or more mixed groups. Divided cargoes are carried in boats which have bulkheads separating their holds into compartments so that different ores can be shipped without mixing.

At the beginning of the year each furnace orders its supply of ore, usually of two or three varieties to meet the requirements of its product. Each of these ores, as is well known, has a phosphorus guarantee and a definite iron and silicon content. It is to meet these requirements that mixing is necessitated, for a certain ore from one mine while satisfactory in respect to the iron content may be high in phosphorus or unsuitable in respect to silicon. By combining a certain percent of this ore with one low in phosphorus an analysis of the mixed ore is obtained which meets the order.

When the tonnage requirements of the blast furnaces have been received for the various ores, the range of specifications is classified by analysis into groups of which there are five this year and the cargoes thereafter are known as "group 1," "group 2," etc. The constituent ores of each group may change from time to time, but the resulting analysis is always the same for that is what determines the grouping. It is also known from the blast furnace requirements after the groups have been outlined just how many tons of each group will be needed for the season. To make up these mixtures a certain amount of ore will have to be shipped from each mine and this is carried to the docks according to a weekly schedule. The mining superintendent is authorized to mine so much each week and he in turn as each train load is shipped to the docks notifies the dock agent of every ton that he is to

expect of each grade of ore, and as a result the dock agent can plan the location of the expected ore ahead of time. When the cars reach the dock, each one is marked with the name of the ore it contains and in dumping into the dock the attempt is made to keep the ore of one kind in adjoining pockets and the various ores that go to make up certain groups in adjoining sections. This avoids as far as is possible the shifting of the boats at the dock, though of course a certain amount of "jayhawking" is necessary. However, each of the pockets in the dock is numbered so that the dock agent has a record of the exact location and amount of every kind of ore in the dock. The placement of the ore necessitates a great amount of switching on the dock. Sometimes the ore is mixed in the pockets and sometimes two kinds of ore are loaded into a boat one after the other through the same pockets, both of which circumstances lessen the amount of shifting required. Ordinarily a cargo can be made up from one side of one dock, but sometimes a boat will have to move over into another slip.

At the unloading ports each furnace is supplied with a weekly allotment of ore of amounts that will aggregate at the end of the season to its season order. To carry out this schedule of delivery is the office of the steamship company. At the lower lake port or on the way up each boat is ordered to a certain place at a certain dock. By the time the boat reaches the dock the agent of the steamship company has arranged with the dock agent to have a certain kind of ore in those pockets and so the loading begins at once and a definite cargo is arranged for. Notice is sent to the agent at the lower lakes of the loading of this certain grade or group of ore on a certain boat and by the time the boat has reached the lower lakes it has been determined to just which dock that cargo should go to meet the schedule.

The general plan is often disarranged by delays in getting certain ores to make up a certain group at the dock, so that while there may be plenty of ore to fill up a boat, it must wait for the definite tonnage of the various ores required to make up its "group" cargo. It sometimes happens as a result that boats of earlier arrival and smaller capacity are longer in loading than later and bigger boats. Delays in the arrival of boats, crowded conditions of the dock, and mining delays often cause changes in order at the last minute and the endeavor to keep the fleet moving as fast as possible results in a season long scramble for accommodations that is terrific.

### SUMMARY OF NAVAL CONSTRUCTION.

In the statement just issued by the bureau of construction and repair concerning the progress of naval vessels it will be noted that the Louisiana is

tallize. It has already been successfully used to prevent electrolysis and corrosion on structural steel, stone work, wooden piles, rail bonds and concrete work. This paint has been made up into a colorless compound for use on

| Name of Vessel.                 | Building at                  | 1906:            |         |
|---------------------------------|------------------------------|------------------|---------|
|                                 |                              | % of Completion. |         |
|                                 |                              | June 1.          | July 1. |
| <b>BATTLESHIPS.</b>             |                              |                  |         |
| Virginia .....                  | Newport News S. B. Co...     | 99.95            | 100.00  |
| Nebraska .....                  | Moran Bros. Co.....          | 94.              | 95.16   |
| Georgia .....                   | Bath Iron Works .....        | 96.70            | 97.47   |
| Connecticut .....               | Navy Yard, New York...       | *97.41           | 97.41   |
| Louisiana .....                 | Newport News S. B. Co...     | 100.             | 100.    |
| Vermont .....                   | Fore River S. B. Co.....     | 85.0             | 88.5    |
| Kansas .....                    | New York S. B. Co.....       | 82.2             | 85.2    |
| Minnesota .....                 | Newport News S. B. Co....    | 89.76            | 91.44   |
| Mississippi .....               | Wm. Cramp & Sons.....        | 57.67            | 59.86   |
| Idaho .....                     | Wm. Cramp & Sons .....       | 55.73            | 58.07   |
| New Hampshire .....             | New York S. B. Co.....       | 45.7             | 48.0    |
| <b>ARMORED CRUISERS.</b>        |                              |                  |         |
| California .....                | Union Iron Works .....       | 93.3             | 94.0    |
| South Dakota .....              | Union Iron Works .....       | 91.1             | 91.8    |
| Tennessee .....                 | Wm. Cramp & Sons.....        | 98.97            | 99.75   |
| Washington .....                | New York S. B. Co.....       | 98.2             | 99.00   |
| North Carolina .....            | Newport News S. B. Co....    | 46.35            | 50.50   |
| Montana .....                   | Newport News S. B. Co....    | 41.32            | 44.72   |
| <b>PROTECTED CRUISERS.</b>      |                              |                  |         |
| St. Louis .....                 | Neafie & Levy S. & E. B. Co. | 96.78            | 98.77   |
| Milwaukee .....                 | Union Iron Works .....       | 95.2             | 96.1    |
| <b>TRAINING SHIPS.</b>          |                              |                  |         |
| Cumberland .....                | Navy Yard, Boston.....       | 95.              | 95.     |
| Intrepid .....                  | Navy Yard, Mare Island....   | 97.5             | 97.5    |
| <b>SCOUT CRUISERS.</b>          |                              |                  |         |
| Chester .....                   | Bath Iron Works .....        | 32.34            | 36.88   |
| Birmingham .....                | Fore River S. B. Co.....     | 34.7             | 38.4    |
| Salem .....                     | Fore River S. B. Co.....     | 35.7             | 39.3    |
| <b>SUBMARINE TORPEDO BOATS.</b> |                              |                  |         |
| Submarine T. B. No. 9..         | Fore River S. B. Co.....     | 72.5             | 75.9    |
| Submarine T. B. No. 10..        | Fore River S. B. Co.....     | 57.6             | 62.0    |
| Submarine T. B. No. 11..        | Fore River S. B. Co.....     | 64.1             | 72.3    |
| Submarine T. B. No. 12..        | Fore River S. B. Co.....     | 56.9             | 59.0    |

\*The percentage of completion refers to contract work, which in the case of the Louisiana has been modified so that installation of battery is to be completed by government.

given as 100 per cent completed. She, therefore, takes her place among the commissioned vessels and will hereafter be omitted from the construction list. The summary is herewith given.

### TRADE NOTES.

The Electric Cable Co., of 17 Battery Place, New York, are now placing on the market for the first time, a new waterproofing paint. This material has been brought to the attention of the United States government authorities at Washington to the extent that they have placed a large order with this company for a paint which shall be used on the bottoms of government vessels. The marine department of the New York Central Railroad Co. has likewise placed an order for a waterproof paint that shall be applied to the bottoms of their tug boats to prevent fouling and corrosive action. It is claimed that this waterproof paint may be made up in any colors and that in addition to its absolute waterproof qualities the colors remain permanent and the paint will not flake off or crys-

stone work and wood work on which the original color is to be preserved.

### BRIEF MENTION.

Col. Oswald H. Ernst, corps of engineers, has been retired with the rank of brigadier general. Col. Ernst has had a distinguished career in the army. He is a member of the International Waterways Commission, to which in the future he will practically devote all his time, as he has just been relieved from duty on the Isthmian canal. He was a brigadier general of volunteers during the Spanish war and in 1899 became inspector general of Cuba.

The docks and railroad terminals built with the establishment of the model town of Texas City by Capt. A. B. Wolvin, have been sold to eastern capitalists of New York. The docks are very up to date and valuable, and as Texas City is but six miles from Galveston and possessed of much better shipping facilities than Galveston, the control of the docks means the control of all the terminal shipping at that point and the deal becomes one of considerable magnitude.

William MacLachlan, of Pickands, Mather & Co., Cleveland, is spending a month's vacation at Canadian points.

H. G. Dalton, of Pickands, Mather & Co., arrived at Two Harbors July 7, and in company with Chas. H. Munger, of the Duluth office, made a trip up to the company's properties.

F. B. Richards, of M. A. Hanna & Co., sails next week for a month's vacation in Europe. He will be accompanied by Mrs. Richards.

J. Pierpont Morgan is expected home from Europe within a few days. He will be here for the annual meeting of the Steel Corporation directors July 31.

A. F. Harvey, assistant general manager of the Pittsburg Steamship Co., was at the head of the lakes during the past week viewing the wrecking work on the Lafayette at Encampment island and on the Edenborn at Split Rock. Returning to Duluth, Mr. Harvey spent some time on the Mataafa which lies in a slip off the harbor.

The steamer South Shore recently completed at the yard of the Fore River Ship Building Co. for the Nantasket Beach Steamboat Co. of Boston, is a model steamer for the service for which she is intended. Her capstans and steering gear were furnished by the Hyde Windlass Co., Bath, Me.; metallic packing by Wm. D. Merrill & Co., 74 India St., Boston, Mass.; and the electric equipment by Warren W. Scott, 200 Summer St., Boston, Mass.

Nearly forty large steamers are now on the way, and forty-four sailing vessels are coming to San Francisco with material for the reconstruction of the burned district. The cargoes of these eighty-four craft consist mainly of structural steel and cement, the greater number coming from New York, Philadelphia, London, Antwerp, and Hamburg. A fleet of these vessels will shortly arrive and their safe anchorage in the harbor will be a great encouragement to the builders of San Francisco.

The Portland Co., Portland, Me., has just received contract for a tow boat intended for outside work from the Bay Shore Lumber Co., Brunswick, Me. The tow boat will be 109 ft. over all, 23 ft. beam and about 11 ft. draught. She is to be fitted with four spacious staterooms for guests of the owner. After the pilot-house will be the captain's cabin and a saloon for the accommodation of guests. Her machinery will consist of a compound engine 15 and 32-in. cylinder diameters by 22-in. stroke, supplied with steam from a three furnace Scotch boiler. The tow boat will be named Pejepscot.

# SCIENTIFIC LAKE NAVIGATION

By Clarence E. Long

## MOUNTING THE STANDARD COMPASS.

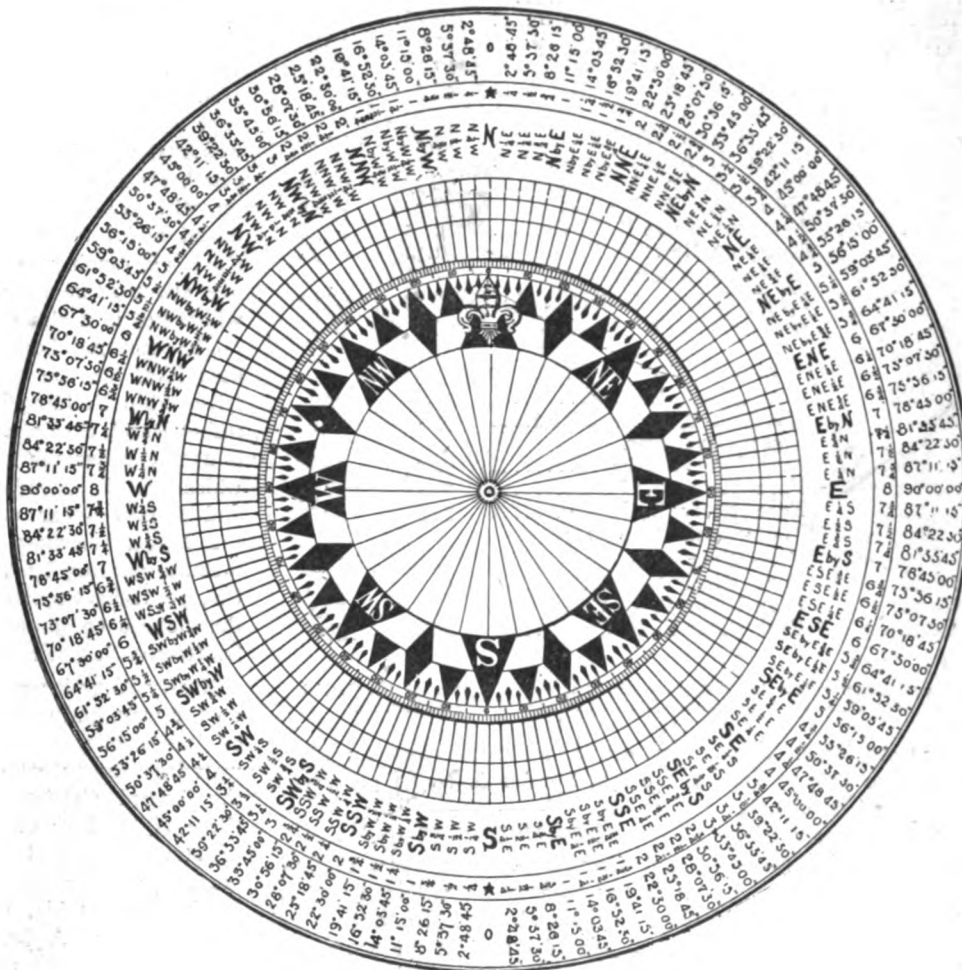
It should be in a position as far as possible from any considerable mass of iron—at least five feet from iron deck beams—and should not be within ten feet of the extremity of any elongated iron mass, especially if vertical, such as fun-

an imaginary line drawn through the center of the boat in a fore-and-aft direction. The binnacle should be placed far enough from the steering compass that the magnets used for compensating the standard compass will not influence the steering compass. Every sailor knows

deviation is often from 3 to 4 points before compensation.

## THE DRY COMPASS.

The finest kind of dry compass is the British Admiralty standard compass devised by Sir William Thompson, now Lord Kelvin. In this



COMPASS CARD.

nels, stanchions, boat-davits, and should be received as a general rule that no iron subject to occasional removal is to be placed within 15 feet of the compass, either on the same deck or that below it. No iron smoke pipes, ventilators, stands for engine room indicators, bells or whistles should be near the position selected for the standard compass. If necessary to have them they should be of bronze or brass. In selecting a place for this compass, deck beams should not enter into consideration; the deck under binnacle can be easily strengthened to give a firm hold to the bolts securing it. This compass must always be placed so that the lubber's point and pivot (that is, the center of the compass) coincides with

that as little iron as possible should be used in the construction and fittings of a pilothouse, and that the hand rail around it should be either of brass or wood. Inside the pilothouse no lockers should be built near the place selected for the steering compass, or any stow-holes left to drop things into. The stand, wheel, spindle and shafting of the steam steering gear should be of brass for a distance of 8 feet from the compass. The system of double wires should be employed in all electric installations on board ship and no single electric wires should lead anywhere near the standard or steering compass. Even in well placed standard compasses on iron and steel ships the

compass, of course, there is no liquid. A comparative amount of steadiness is obtained by mounting the card on two pairs of needles. Dry compasses are useless for steering, especially in small vessels, because the card flies about wildly. In large ships they are used for setting the vessel's course, but the steering is done by a liquid compass.

The magnet system of the Thompson compass consists of eight small needles (see illustration) from  $\frac{3}{4}$  to 2 inches long, made of thin steel wire and weighing in all 54 grains, are fixed like the steps of a rope ladder on two parallel silk threads woven through eyes in the ends of the outer pairs of needles. Be-



ing strung underneath keeps the center of gravity low, which in its turn tends to correct the magnetic dip in high latitudes.

Steadiness is further increased in a Sir William Thompson (dry) compass by giving the bowl a false bottom, partly

the compass gives very poor results in a sea-way.

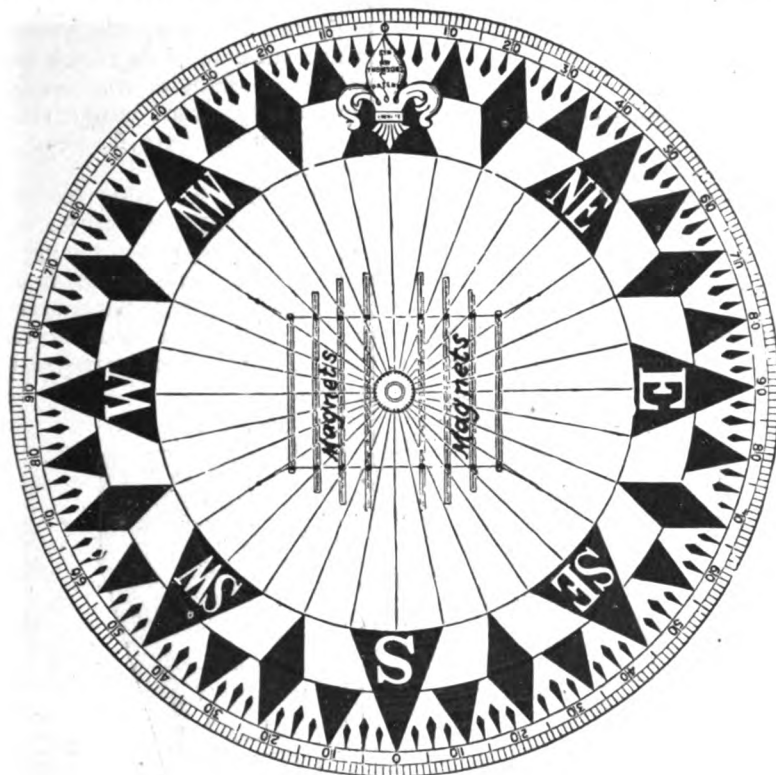
Since the above was written and during the past several years, Lord Kelvin has added many valuable improvements to his then wonderful compass. To Lord Kelvin is due the credit of revolution-

plurality of them. The mechanical construction of this compass was near perfection itself, and considering it either from a theoretical or practical standpoint, it had advantages which no other compass then possessed. His latest improved pattern is radically different from the old original pattern.

The recent improvements are: Anti-vibrational suspension, helmet with rifle sights for instantaneous bearings and lighting from below. The more exacting conditions in modern steamers, where greater speed often means greater vibration, now demand high efficiency in the suspension of compasses. The newest method of suspending Lord Kelvin's compass is the result of careful investigation, and many prolonged experiments. It has been chosen as the one which best preserves that steadiness in the card for which the Thompson compass is noted. This improvement has already been adopted with very gratifying success on board steamships having a large amount of vibration.

The illumination of the compass at night is now entirely effected from underneath the bowl. The under part of the bowl is of strong annealed, thick glass, through which the light is refracted on the card.

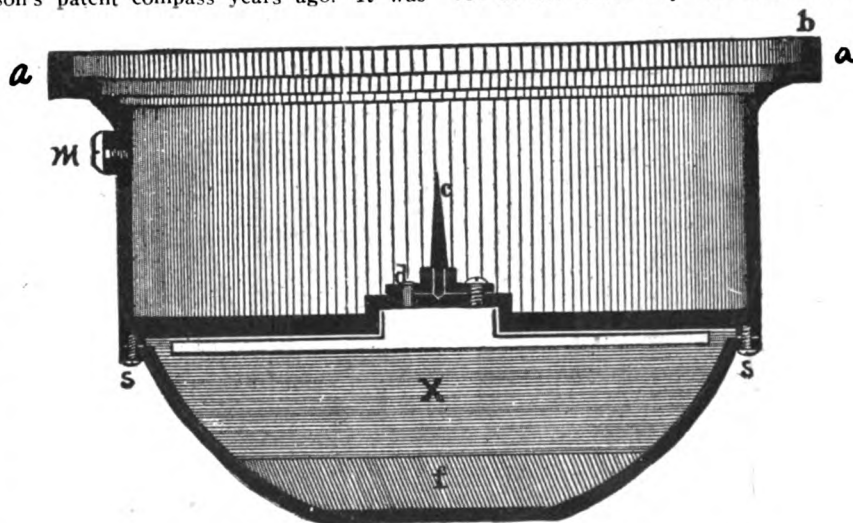
A new form of helmet is now introduced having rifle sights upon the top. This helmet moves around freely in any direction, and bearings of the sun, lights, buoys, or other objects are taken instantaneously and read directly upon the compass card. Bearings by azimuth mirror in the usual way can also be taken



MODERN MARINER'S COMPASS.

filled with a viscous fluid—preferably castor oil—which acts as a “drag” on the inner surfaces. As this compass bowl is suspended on knife-edge gimbals it gives great ease of movement, the object being to keep the compass steady in a sea-way. With the knife-edge gimbals the friction is very small, so that if the ship were rolling or pitching much, the bowl would set into rapid oscillation, and its isochronism (uniform in time) with the card would be destroyed; in fact, the suspension would be too free for the intended purpose, and this is the reason for adding the drag. Thus the evil which would result from the overgreat freedom of the knife-edge bearings in the gimbal rings is cured, not by the addition of weight as such, but by the action of what might correctly be termed a “fluid friction-break.” This contrivance consumes the surplus energy of the bowl, and keeps its motion within bounds. A double bottom wholly filled with liquid would not have so good an effect as one partially filled. The amount of fluid used was, of course, first ascertained by actual experiment. There is only one of these compasses in use on the lakes as far as we know, and this one is on a steam yacht. Owing to the craft being small

izing the mariner's compass by the introduction of Sir William Thompson's patent compass years ago. It was



INTERIOR AND SIDE VIEW OF COMPASS BOWL RITCHIE COMPASS.

Lord Kelvin who was first to bring into fashion a really satisfactory form of compensating binnacle; and, with modifications, the bulk of compass makers have followed in his wake. It was he who originated the idea of using short needles and a

by day or night without removing the helmet. These facilities for taking bearings smartly and conveniently are greatly appreciated. The lighting improvement has been found particularly useful in taking bearings of stars or other faint lights, since an arrangement is fitted for

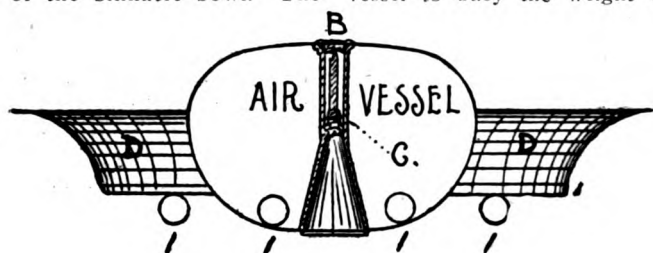
increasing or diminishing the intensity of the light at the pleasure of the observer.

The suspension of this new form of compass is controlled by four spiral springs, two each being secured on the forward side and the other on the after side of the binnacle bowl. The

The above picture represents the card and magnet system of a Sir William Thompson, now Lord Kelvin, compass. It is of the "dry" kind, that is, there is no flotation power to keep the card steady—from flying about when the vessel rolls and pitches—nor is there an air vessel to buoy the weight of the card

sion and so much of the weight as is accumulated in the rim, the hammering action of the card and its appendages, on the pivot during vertical shocks or tremors is greatly diminished; also, but to a smaller extent, from horizontal shocks. This is owing to the threads being in tension—taut—that the latter effect is not so pronounced. Generally speaking, the flexible structure of the card is the principle upon which this mechanical contrivance is based, and as such, the energy of a disturbing force is taken up and dispelled.

This object is further increased by having the suspension of the compass bowl and its contents under the control of two sets of spiral springs, in addition to the gimbal rings of the ordinary compass. This has the effect of relieving the tension in case of shocks as in roll-



THE METALLIC CARD.

springs lead athwartships. They take up every particle of vibration, thus giving the magnet system of the card the free action that it should have in order that it work in obedience to the attractive powers which control it.

The card of a modern mariners' compass shows the regular system of notation—points and degrees, together with the magnet system of a good modern instrument. The modern made compass, instead of a single magnet, contains from 6 to 8 magnets (bundles of fine steel wires), highly magnetized, and laid parallel with one another (in a north and south direction), as shown in the above picture. The magnets are attached to the card, which is free to turn upon the point of a steel cone, or pivot, rising from the bottom of the bowl; or in a liquid compass floats on a liquid—spirits of wine, or oil (benzine). One

and magnets, to prevent frictional error. These complications are overcome in an-



SPIRIT COMPASS OF THE RITCHIE PATTERN.

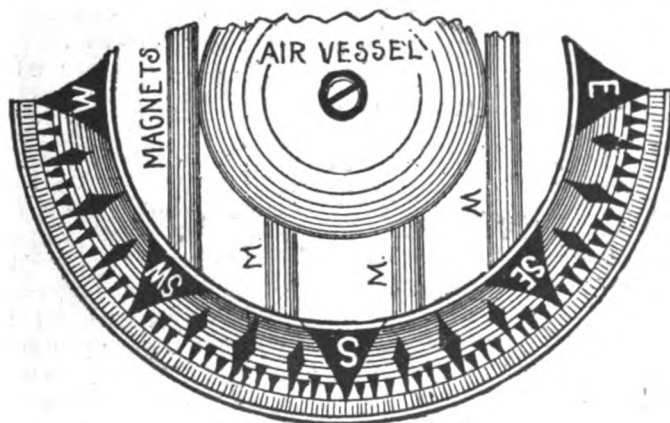
other way. In the first place the card is supported on its outer edge by a thin

ing and pitching, and counteracts the effects from vibration of the machinery; also, when the vibrational period between machinery and that of the hull, caused by either rolling or pitching, are in union. The bowl and contents of the old-style pattern of the Sir William Thompson compass is slung from an elastic copper grommet, in addition to the gimbal rings. The vibration springs of the new pattern is the improvement over this grommet, both supposing to answer the same purpose.

The card itself is of thin, strong paper, and all the central parts of it are cut away, leaving only enough to show conveniently the ordinary points and degree divisions of the compass.

#### THE POLE COMPASS.

A compass that is elevated over the deck by means of a long, stout pole. Access is had to the instrument by a ladder fixed permanently between the deck and the top of the pole. The compass is so situated to remove it beyond the disturbing influence of the ship's iron. There is more wear on the pivot point and jeweled cap of a pole compass than



TOP VIEW OF METALLIC CARD.

an oil compass. In the liquid compass the card with the magnets attached is so adjusted that it exerts only a trifle downward pressure on the pivot. This is done by means of an air vessel attached to the frame supporting the card to buoy its weight and that of the magnets.

rim of aluminum—a strong but exceedingly light metal—and its inner parts on 32 silk threads (the radial lines in the picture) stretched from the rim to the small central boss of aluminum, making it appear as the spokes in a wheel. The silken threads being an elastic medium between the point of suspen-

those located nearer the hull owing to the increased motion aloft. Therefore, a pole compass needs more care and looking after, especially if the vessel is in a rough weather trade, or out in much heavy weather. In case the elevated compass should be mounted on a single pole care must be exercised in

Beneath the bowl is a metallic, self-adjusting expansion chamber of elastic metal, by means of which the bowl is kept constantly full without the show of bubbles or the development of undue pressure caused by the change in volume of the liquid due to changes of temperature. The rim of the compass

grains is in the steel of the magnets.

The magnet system of the card consists of four cylindrical bundles of steel wires, each wire 0.06 in. in diameter, laid side by side with each other and magnetized as a bundle between the poles of a powerful electro-magnet; they are afterwards placed in a cylindrical case, sealed, and secured to the card. The series of steel drawn into wire is more homogeneous, can be more perfectly tempered, and for the same weight gives greater magnet power than the solid steel bar.

Two of the magnets are each  $5\frac{3}{4}$  in. long and are placed parallel to the north and south diameter of the card and on the chords of 15 degrees nearly of a circle passing through their extremities; these magnets pass through the air-vessel to which they are soldered and are further secured to the bottom of the ring of the card. The other two magnets of the system are each  $4\frac{3}{8}$  in. long and are placed parallel to the longer magnets on the chords of 45 degrees nearly of a circle passing through their extremities, and are secured to the bottom of the ring of the card.

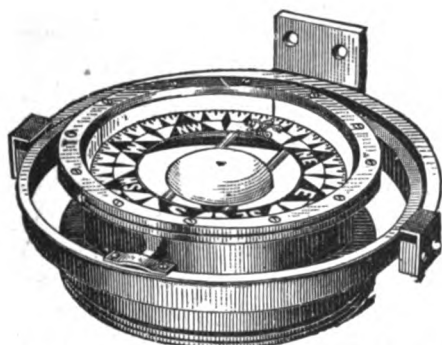
The departure from a single magnet or needle to a system of four magnets placed as above is based upon calculation; the magnets so placed eliminating the chances of error in a mechanically corrected compass on board ship, due to mutual induction between needles and correctors, that would occur with a compass containing a single needle, besides giving other advantages to be mentioned later.

The details of the compass having been described, an idea of its essential properties of magnetic moment, sensibility, and steadiness may be gained from the tests to which it is subjected by the compass office before acceptance.

In order to insure the best possible workmanship, the individual parts are sent to the compass office for inspection. The needles are tested for magnet power and weight, the cards are weighed, the pivots and jewels are examined under a microscope, and the best only are selected for the compasses under repairs or manufacture.

**Magnetic moment.**—This is tested by drawing the card aside one point by means of a magnet, and observing the time of oscillation from the instant of the passing of the north point over the cross wire of a telescope and its return.

**Sensibility.**—The mean density of the submerged card admits of being so adjusted to the density of the liquid, as to secure any desired buoyancy, and so produce any desired pressure of the card upon the pivot. The pressure in



RITCHIE DOUBLE CARD TRANSPARENT COMPASS.

getting a spar or pedestal that will not warp, and throw the lubber line out of the amidship fore-and-aft line of the vessel.

Pole or mast compasses have less deviation, when properly constructed and placed, and are much more constant than compasses nearer the hull. Care must be taken not to place this compass near an iron mast, wire rigging, iron blocks, etc. Unless these precautions are religiously carried out, the pole compass will not work properly.

**Tell-Tale** compasses are inverted compasses, suspended from overhead in the cabin, or elsewhere below. The tell-tale compass is usually secured to the ceiling of the master's cabin sometimes over the captain's berth, where he can, while lying in bed, watch the steering of his vessel. These compasses are of the dry card pattern.

There is also what is called a double card transparent compass. This compass can be read from above or below.

A tell-tale compass is of little service unless finely constructed and a card with large diameter, nothing less than 9 inches. THE LIQUID COMPASS OF THE U. S. NAVY. [Extracts from Practical Problems and the Compensation of the Compass in the United States Navy.]

This compass consists of a skeleton card  $7\frac{1}{2}$  inches in diameter, made of tinned brass resting on a pivot in liquid, with provisions for two pairs of magnets symmetrically placed as hereafter described.

The card is mounted in a bowl made of cast bronze, the glass cover of which is closely packed with rubber, completely preventing the evaporation or leakage of the liquid, which entirely fills the bowl.

bowl is made rigid and its outer edge turned strictly to gauge to receive the azimuth circle.

The lubber's line is a fine line drawn on an enameled plate on the inside of the bowl, whose inner surface is covered with a white paint which is insoluble in the liquid.

The liquid is composed of 45 per cent pure alcohol and 55 per cent distilled water and remains liquid at a low temperature, exceeding  $-10^{\circ}$  Fahr.

The card is of a curved, annular type, the outer ring being convex on the upper and inner side and is graduated to read to one-fourth point, a card circle being adjusted to its outer edge and divided to half degrees, with legible figures at each three degrees for use in reading bearing by an azimuth circle or in laying the course to degrees.

The card is provided with a concentric, spheroidal air vessel, to buoy the weight of the card and magnets, allowing a pressure of between 60 and 90 grains on the pivot at  $60^{\circ}$  Fahr. The air vessel has within it a hollow cone, open at its lower end and provided with the pivot bearing or cap containing a sapphire which rests upon the pivot and so supports the card. The cap is provided with two small screws for accurate adjustment in centering the card.

The pivot is fastened to the center of the bottom of the bowl by a flanged plate and screws. Through this plate and the bottom of the bowl are two small holes which communicate with the expansion chamber and admit of a circulation of the liquid between it and the bowl. The point of the pivot is of bell metal and moderately sharp.

The weight of the card complete in air is about 3,060 grains, of which 1,600



the  $\frac{7}{8}$ -in. card is allowed to vary between 60 and 90 grains at mean temperature of 60° F., in order to provide for variation of temperature and consequent changes of density of the liquid, actual contact being secured at all times between the cap and pivot.

of card suspension which is much above the center of gravity and center of buoyancy, and in the elevation of the line of buoyancy above the center of gravity.

2nd. In the shortness of the magnets and concentration and distribution

its side with the filling hole up (indicating by the screw on the edge of the bowl). Bring the bubble immediately underneath the filling hole. Press the expansion chamber, and while keeping up a constant light pressure upon it, gradually loosen the screw one

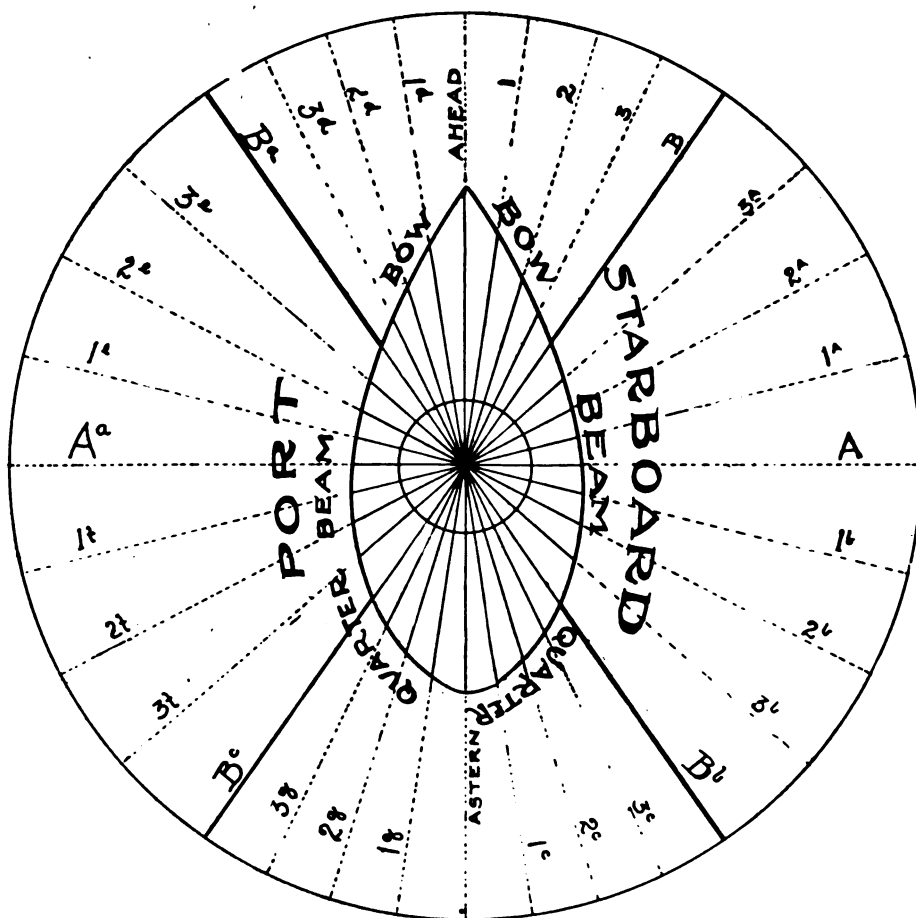


DIAGRAM EXPLAINING RELATIVE BEARING METHOD.

The friction on the pivot is further diminished by the strong directive force of the magnets and by the use of a sapphire of best stone and smoothest workmanship.

With the friction at a minimum and the power at a maximum, a sensitive compass of strong directive force is gained, which has undergone the severe test of long cruises with the best results.

The inspection test for sensibility consists of bringing the cross-hair of a telescope in exact coincidence with a division on the card circle; the card is then deflected one or two degrees by a magnet and allowed to come to rest, the change of the reading of the card, if any, showing the defect of sensibility. No error in this respect is allowed by the inspector in the examination of compasses before acceptance.

Steadiness.—The compass has attained a high standard in this respect, for several reasons.

1st. In the elevation of the center

of their weights, securing a small amount of inertia equal about all diameters of the card.

3rd. In the use of a liquid resisting medium.

4th. In the use of a buoyant skeleton card adjusted to a very small pressure at the pivot.

The test for steadiness of the compass consists in subjecting it to an exaggerated motion and to shocks which a ship at sea might experience. The card of the navy compass shows very little motion, whereas a dry card subjected to the same test would spin round and round.

The compass is mounted in its binnacle, in which it has an easy motion, the leaden weight in the false bottom of the bowl assisting to keep the card horizontal during the rolling and pitching of a vessel at sea.

TO EXPEL AN AIR BUBBLE FROM A RITCHIE LIQUID COMPASS.

Remove the false bottom of the compass bowl, exposing to view the expansion chamber. Place the bowl on

or two times. Let the air escape around the threads of the screw, also a little of the liquid. Set the screw up tight and remove the pressure from the expansion chamber.

If the bubble has not entirely disappeared make another trial as above. Should the bubble increase in size remove the screw and pour in the filling hole distilled water or alcohol to the running over point. Enter the screw into the filling hole, and before setting up put a slight pressure on the expansion chamber. Set up the screw for a full due.

A few trials may be necessary to accomplish the desired end, but the method is simple and effective.

#### THE INTERNAL ARRANGEMENT OF A RITCHIE COMPASS.

b, top of the compass bowl proper, to which is secured the brass flange that holds the glass top and rubber packing into place. a a, the fore-and-aft bearings, which ride in the bearing cups of the gimbal; see illustration



herewith. c, the pivot of bell metal rising from the bottom of the bowl, which supports the card and magnets. d, one of the small holes, leading from the bowl to the expansion chamber, admitting a free circulation of the liquid between the two. s s, screws securing the lower section of the bowl, containing the expansion chamber and the lead bottom, to the bowl proper. x, the self-adjusting expansion chamber of elastic metal. f, the lead bottom, which assists in keeping the bowl level when the ship rolls and pitches. m, filling-hole screw.

#### THE METALLIC CARD.

Side view of the dial showing the spheroidal air vessel. B, is the screw cap which holds the jewel into position. C, is the jewel at the head of the hollow cone inside. D D, the concavity of the dial. I I I I, receptacles for the cylindrical bundles of fine steel wires, which are placed within, and the end caps sealed by soldering. The latest dials of a Ritchie compass are flat, and are made of a rim of celluloid to which the paper card is fastened, and the magnets to this an air vessel.

M M M, receptacles with the magnets within. The latest Ritchie card contains receptacles for a system of six bundles of wire magnets, instead of four as in the above.

#### SPIRIT COMPASS OF THE RITCHIE PATTERN.

The picture shows the latest production of a spirit compass of the Ritchie pattern, manufactured for Negus, of New York.

The spheroid (the circular, or ball-shaped form) in the center of the compass card, is the air-vessel, previously mentioned, which buoys and sustains the weight of the card and magnets, allowing only a small exertion on the pivot, or point of support.

The magnets are the slender bars (bundles of wires) laid parallel with one another in the direction of north and south on the card. These magnets are placed at various chords. The two bars running crossways of the magnets, on either side of the air-vessel, are the pieces of metal to which the magnets are secured; these in turn being fastened to the card underneath. The lubber's point, or mark, is the vertical black mark, on the forward side, coinciding with N  $\frac{1}{4}$  E (large) on the card.

The circular rim, with the screws in it, is the flange, which holds the glass top in place and presses the rubber packing around the edge of the glass.

The horizontal ring, between the compass bowl and box, in which the compass is suspended, is the gimbal, and it is what keeps the compass hori-

zontal, or level by tipping freely as the vessel rolls and pitches.

The position of the compass, as shown above, is just as it should face the wheelsman, the athwartship bearings being on the sides, to preserve the up and down motion of the compass when the vessel dives into it. The athwartship bearing cups are always secured to the compass box, or binnacle, and the bearings to the gimbal. The fore-and-aft bearings are secured to the compass bowl, and the cups in which they ride, are made in the gimbal. The fore-and-aft bearings keep the compass level when the vessel rolls.

The screw head, in the center of the air-vessel, contains the sapphire, or jewel, which rests upon the pivot and so supports the card and its appendages.

From their many years' experience in handling this compass, and adjust-

quick and steady under all conditions.

These improvements Ritchie is now embodying in all the compasses made for Negus.

The manufacturers claim that the Ritchie compass excels any other liquid compass in the world for small errors in iron vessels, ease of adjusting, steadiness and quickness under all conditions.

#### RITCHIE DOUBLE CARD TRANSPARENT COMPASS.

This is a liquid compass made in seven, eight and nine inches diameter of card, and can be read from below as well as above. Could be used as a tell-tale compass as, for instance, in a sailing vessel, where the binnacle and compass set into the cabin. The "old man" could stand his watch in the cabin and work up his "dead-reckoning" without so much as going on deck, the log-book furnishing him with the

| Points.                 | Number.       | Degrees. | Number.       | Points.                 |
|-------------------------|---------------|----------|---------------|-------------------------|
| North.                  | 0             | 0 0 0    | 0             | South.                  |
|                         | $\frac{1}{4}$ | 1 24 22  | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 2 48 45  | $\frac{1}{2}$ |                         |
|                         | $\frac{3}{4}$ | 4 13 07  | $\frac{3}{4}$ |                         |
|                         | $\frac{1}{2}$ | 5 37 30  | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 7 01 52  | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 8 26 15  | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 9 50 37  | $\frac{1}{4}$ |                         |
| N by E.....N by W..     | 1             | 11 15 00 | 1             | S by W.....S by E..     |
|                         | $\frac{1}{4}$ | 12 39 22 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 14 03 45 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 15 28 07 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 16 52 30 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 18 18 52 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 19 41 15 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 21 05 37 | $\frac{1}{4}$ |                         |
| N N E.....N N W..       | 2             | 22 30 00 | 2             | S S W.....S S E..       |
|                         | $\frac{1}{4}$ | 23 54 22 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 25 18 45 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 26 43 07 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 28 07 30 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 29 31 52 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 30 56 15 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 32 20 37 | $\frac{1}{4}$ |                         |
| N E by N.....N W by N.. | 3             | 33 45 00 | 3             | S W by S.....S E by S.. |
|                         | $\frac{1}{4}$ | 35 09 22 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 36 33 45 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 37 58 07 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 39 22 30 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 40 46 52 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 42 11 15 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 43 35 37 | $\frac{1}{4}$ |                         |
| N E.....N W..           | 4             | 45 00 00 | 4             | S W.....S E..           |
|                         | $\frac{1}{4}$ | 46 24 22 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 47 48 45 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 49 13 07 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 50 37 30 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 52 01 52 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 53 26 15 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 54 50 37 | $\frac{1}{4}$ |                         |
| N E by E.....N W by W.. | 5             | 56 15 00 | 5             | S W by W.....S E by E.. |
|                         | $\frac{1}{4}$ | 57 39 22 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 59 03 45 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 60 28 07 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 61 52 30 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 63 16 52 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 64 41 15 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 66 05 37 | $\frac{1}{4}$ |                         |
| E N E.....W N W..       | 6             | 67 30 00 | 6             | W S W.....E S E..       |
|                         | $\frac{1}{4}$ | 68 54 22 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 70 18 45 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 71 43 07 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 73 07 30 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 74 31 52 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 75 56 15 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 77 20 37 | $\frac{1}{4}$ |                         |
| E by N.....W by N..     | 7             | 78 45 00 | 7             | W by S.....E by S..     |
|                         | $\frac{1}{4}$ | 80 09 22 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 81 33 45 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 82 58 07 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 84 22 30 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 85 46 52 | $\frac{1}{4}$ |                         |
|                         | $\frac{1}{2}$ | 87 11 15 | $\frac{1}{2}$ |                         |
|                         | $\frac{1}{4}$ | 88 35 37 | $\frac{1}{4}$ |                         |
| East.....West..         | 8             | 90 00 00 | 8             | West.....East..         |

ing it in iron vessels, the Negus' have been able to make an improvement by which it has less errors in iron vessels, is more easily adjusted, and is

remainder of the necessary data for the purpose. This is a handy compass to place in a sky-light, where it can be read from either above or below.

# COMPASS CARD DIVIDED INTO ONE-EIGHTH POINTS.

Conversion of compass points into degrees and vice versa.—Compasses on board many vessels are graduated simply in points and fractions thereof. The table given below for converting points and fractions thereof into degrees, minutes and seconds may prove of convenience to the mariner. Courses on many charts of the great lakes are given in degrees only; by a glance at the following table the mariner can pick out the course to be steered in points. After taking a bearing of the sun for the computation of the deviation of the compass by the time-azimuth method, this table will be found convenient for changing the compass bearing of points and fractions thereof into degrees, minutes and seconds without the tedious process of involution:

Boxing the compass to eighth points is performed in the same manner as that of the quarter points; thus, N, N  $\frac{1}{8}$  E, N  $\frac{1}{4}$  E, N  $\frac{3}{8}$  E, N  $\frac{1}{2}$  E, N  $\frac{5}{8}$  E, N  $\frac{3}{4}$  E, N  $\frac{7}{8}$  E, N by E, N by E  $\frac{1}{8}$  E, and so on. Courses to eighth points may be steered by a compass graduated to quarter points by holding the vessel's course between the quarter points; for instance, supposing the course to be steered was NE  $\frac{5}{8}$  E, the vessel's head would be kept so that the lubber's point or line coincided with the middle space between NE  $\frac{1}{2}$  E and NE  $\frac{3}{4}$  E, making the course NE  $\frac{5}{8}$  E, or steer NE  $\frac{1}{2}$  E for half the distance and NE  $\frac{3}{4}$  E the other half.

## A CORRECTION.

Mr. Frank Watkins, compass adjuster and marine optician, of Cleveland, O., has called my attention to the following: "With reference to your article entitled 'The Patent Sounding Machine,' published in the issue of June 14, I have to inform you that the statement as to chemical tubes being useless on the great lakes, because the same cannot act, is exceedingly misleading. Lord Kelvin's sounding apparatus with chemical tubes is now adapted for use in 'fresh' water with equally good results on salt water. Referring to the expense of a new glass tube every sounding—the same costs 25 cents—and remains for all time an indisputable record, if required. The whole value loss of breakage of the sounding wire amounts to an iron sinker, brass tube and glass chemical tube; cost in all \$4. A depth recorder if lost entails a loss of \$27.50 at least."

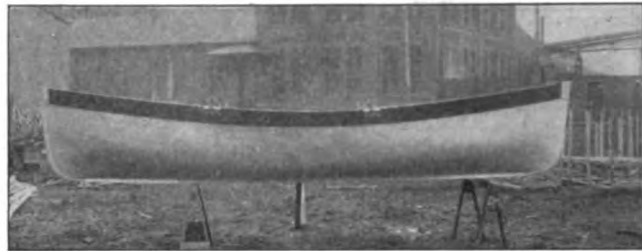
Mr. Watkins further states that while he was in England last winter he was approached by Kelvin & J. White, Ltd., to take their agency for the great lakes; he pointed out that the chemical tubes could not be used; the matter was re-

ferred to Lord Kelvin with the result of a tube coated with a compound that discolors with fresh water.

One of the most important operations in navigation is the taking of soundings, especially in deep water, and it is one which is far too little used, as is shown

## WALTER WELLMAN'S STEEL LIFE BOAT.

The W. H. Mullins Co., Salem, O., has designed a pressed steel life boat for Walter Wellman, to be used by him in his Arctic expedition. The purpose, as stated, is to carry the boat on the air-



WALTER WELLMAN'S LIFE BOAT.

by the numerous shipwrecks caused by "neglect of the lead." To facilitate the work of taking soundings, Sir William Thompson (Lord Kelvin) several years ago designed his sounding machine for obtaining soundings in any depth down to 100 fathoms with ease and quickness without stopping the ship or decreasing the speed of the vessel. As is well known the machine proved most successful. In the course of time, many improvements upon the original design have naturally

ship which Mr. Wellman intends to use to discover the pole when his steamer is no longer able to make headway through the ice. The wooden frame, consisting of best selected oak keel and ribbed, steam bent, is extremely rigid. The ribs are not simply nailed or screwed to the keel but passed through it. The keel itself is not fastened on the outside of the metal shell by means of bolts, as is usually done on other boats, but is inside the boat, being placed in a slot or groove,

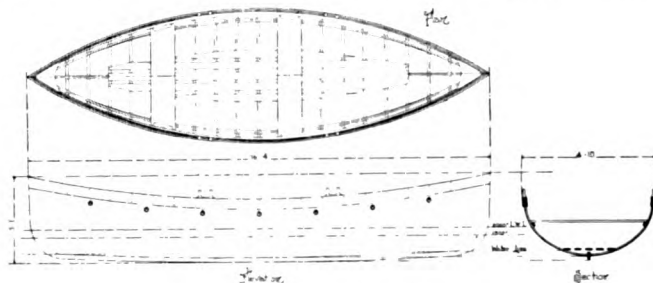


DIAGRAM OF THE WELLMAN BOAT.

been found practicable and desirable, and the manufacturers have introduced an entirely new form of the machine, embodying a number of alterations which greatly enhance its usefulness. The new model of the machine is in a more handy form for using, and it is of a height which from experience has been found to be the most convenient for the work of winding in the line. The reel of the machine has been redesigned to give greater freedom in working, and the action of the brake has been greatly improved. Another great advantage of the new pattern is that the working parts are all visible, and can be easily removed for cleaning or repairs.

Mr. Watkins is now engaged in introducing this sounding machine and we hope to hear of its good performance on lake vessels. There is not a boat on the lakes but what ought to be equipped with a patent sounding machine, and it is a matter that the insurance companies should look into.

LONG.

pressed into the steel shell. The shell is constructed of double-coated galvanized pressed steel. The joints are countersunk and riveted in the same way as the plates of a torpedo boat, making the whole practically one piece of strong, smooth steel, capable of hard usage.

The newspaper statement that Representative Burton, chairman of the rivers and harbors committee, will ask at the next session of congress for an appropriation of \$75,000,000 for the improvement of harbors and waterways is not entirely correct. It is probable that the bill including appropriations and authorizations will aggregate that amount, but some of the authorizations will be spread out over a very considerable time. There are a number of projects under way which will take years to complete. Mr. Burton believes that river and harbor appropriations should be made with liberality and yet with discrimination.



# THE MARINE REVIEW

VOL. XXXIV.

CLEVELAND, JULY 19, 1906.

No. 3.

## PARTIAL SHIPMENT Leather Belting for San Francisco, Cal.

MANUFACTURED BY  
The Republic Belting and Supply Co.  
Cleveland, Ohio.



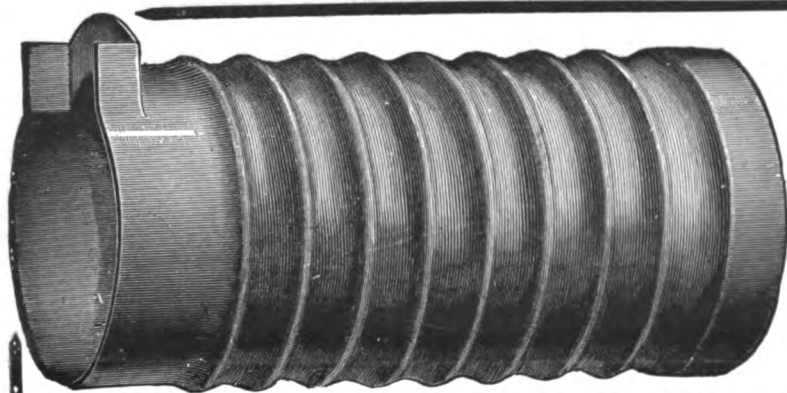
Send for samples and prices.

Quick delivery guaranteed.

We also make Leather Polishing Wheels, Polishing Strips, Valves, Clutch Leathers, Etc.

Exclusive Agents for Great Lakes for Republic Rubber Co. Also special agents  
for B. F. Sturtevant Co. of Boston, Mass.





## Morison Suspension Boiler Furnaces

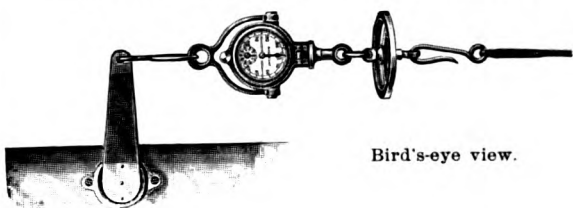
For Land and Marine Boilers

Uniform Thickness—Easily Cleaned  
UNEXCELLED FOR STRENGTH

Also Fox Corrugated Furnaces

Manufactured by **THE CONTINENTAL IRON WORKS,** West and Cayler Sts., NEW YORK.  
Near 10th and 23d Sts. Ferries  
Borough of Brooklyn.

### WALKER'S PATENT "Excelsior" Log FOR MOTOR-BOATS AND YACHTS



Bird's-eye view.

Used on "Napier Major" motor-boat in her non-stop trip "London to the Shetlands." The following is an extract from the Report :

"We take this opportunity of expressing our satisfaction of the Log, which proved itself to be as accurate as is possible, and is compact and altogether satisfactory for a small vessel. It was of great service to the yacht in her voyage."

Can be supplied to register **STATUTE MILES**  
if specially ordered.

**Thos. Walker & Son, Ltd.**  
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THE DEPENDABLE MARINE MOTOR



Made to withstand the most severe and continuous service. A practical design characterized by the accessibility, compactness and simple ignition, gas producing and oiling features. Perfect control.

Four cycle type two and four cylinders, from 8 to 65 H.P. Smaller sizes of the two cycle type. Catalogue and copy of The Launch for the asking.

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SHIP MACHINERY, embodying the latest designs and many important patented improvements.

Sole builders of the Original and Only  
**AUTOMATIC  
STEAM TOWING MACHINE.**

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8 SIZES, 11 STYLES

Seafaring men can give their own opinion of Shipmate Ranges better than we can express it for them.

Capt. Bond, of the schooner Ella M. Willey, says, "If I didn't have a Shipmate I would throw overboard what I did have and get one."

Sold on the Lakes by

The T. B. Rayl Co., 112-116 Woodward Ave., Detroit,  
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THE STAMFORD FOUNDRY COMPANY

Stamford, Conn.

Established 1830.

# G

## Wrecking Steamer FAVORITE

Located at St. Ignace this Year.

The Wrecking Steamer FAVORITE, Alex. Cuning, Master, will be stationed during season 1906 at ST. IGNACE, MICH. A Long-Distance Telephone has been installed on board the steamer. When at her home dock, the steamer can be reached by telephone any time day or night, 'Phone Number 63, and in absence of steamer full information as to the steamer may be obtained by telephoning to residence of Capt. Cuning, St. Ignace.

The Favorite and her equipment were thoroughly overhauled during the past winter, and are in first class condition to do outside work.

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DETROIT RIVER  
DETROIT MICH.

12 Pockets. Platform.  
Low Dock.

Operated by

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Steamboat Fueling Facilities at Various Points on the Great Lakes

CLEVELAND HARBOR { 4 Car Dumpers.  
3 Lighters.

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DETROIT RIVER BRANCH { Docks and Pockets at  
Sandwich and Amherstburg.

SAULT RIVER BRANCHES { Dock—Pittsburgh Landing.  
Dock and Pockets at Sault Ste. Marie. (The Port Royal Dock Co.)

WE FURNISH ONLY THE BEST GRADE OF

## PITTSBURG AND YOUGHIOGHENY COAL



## The American Ship Building Company.

MAIN OFFICE CLEVELAND, OHIO

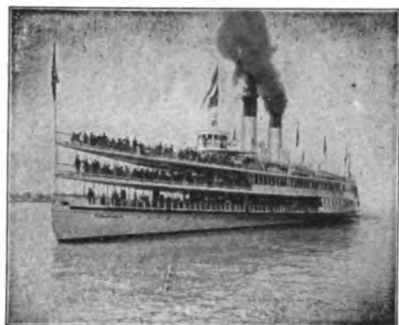
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Boilers and  
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Sole Agents for the Lakes for the Ellis & Eaves Induced Draft System,  
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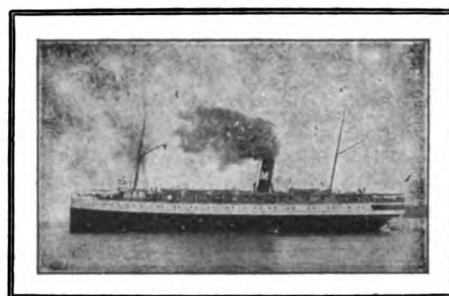
Steel Ship Yard located at Wyandotte, Michigan  
Wooden Ship Yards and Dry Docks, Foot of Or-  
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*Passenger or Freight*

ANY SIZE

Yards, Dry Docks and Repair  
Shops at South Chicago, Ill.



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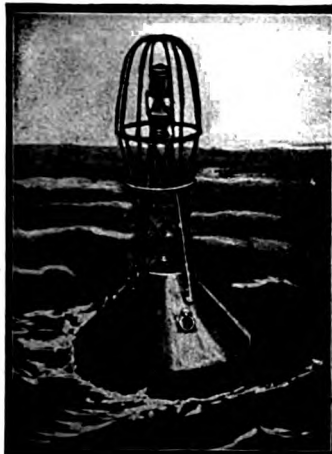
*Dry Docks and Repairs of all kinds*

Large stock of material always  
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Repairing promptly attended  
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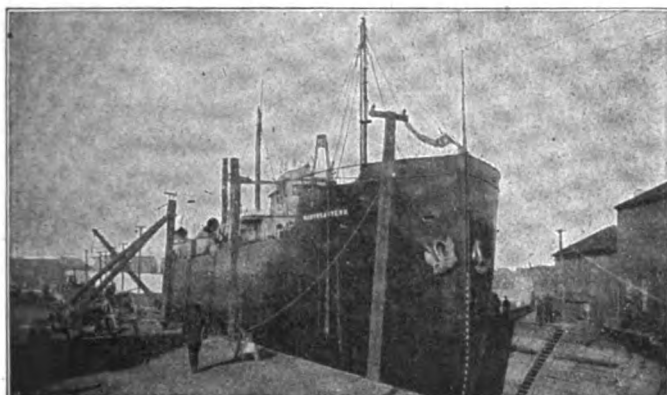
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**SHIP REPAIRS  
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We have two ship yards offering every facility for the repair of both steel and wooden vessels. South Yard Dock is 450 ft. long on keel blocks; 460 ft. over all; 60 ft. width of gate and 16 ft. over sill. West Yard Dock is 312 ft. on keel blocks; 45 ft. width of gate and 12 ft. over sill. Rudder pit in each dock.

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Operating four Docks, Sixty-Ton Shear Legs, and in every way equipped with modern plant for building and the economical repairs of **STEEL AND WOODEN SHIPS.**

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**TOLEDO, OHIO**

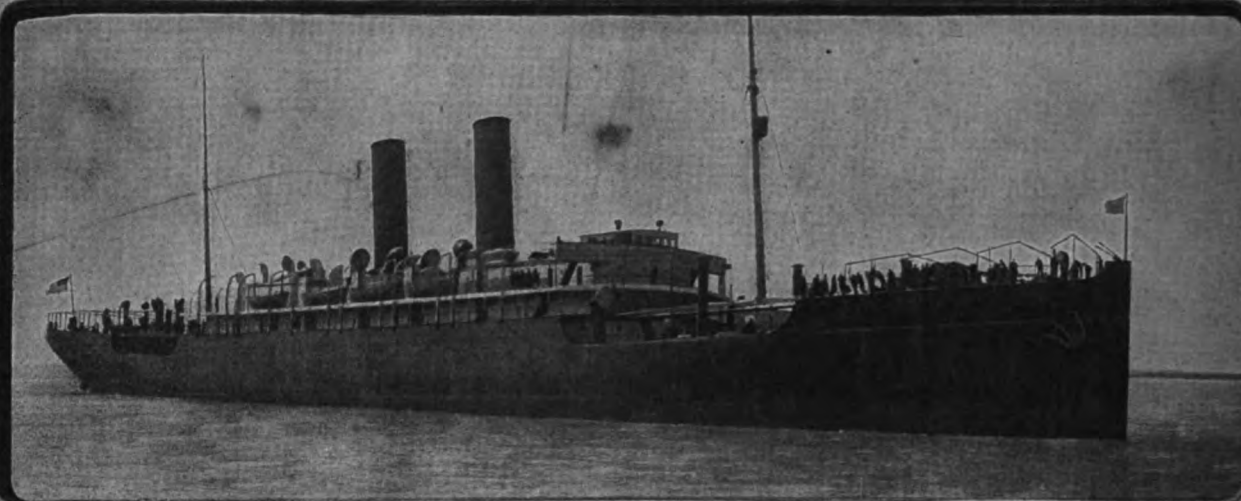
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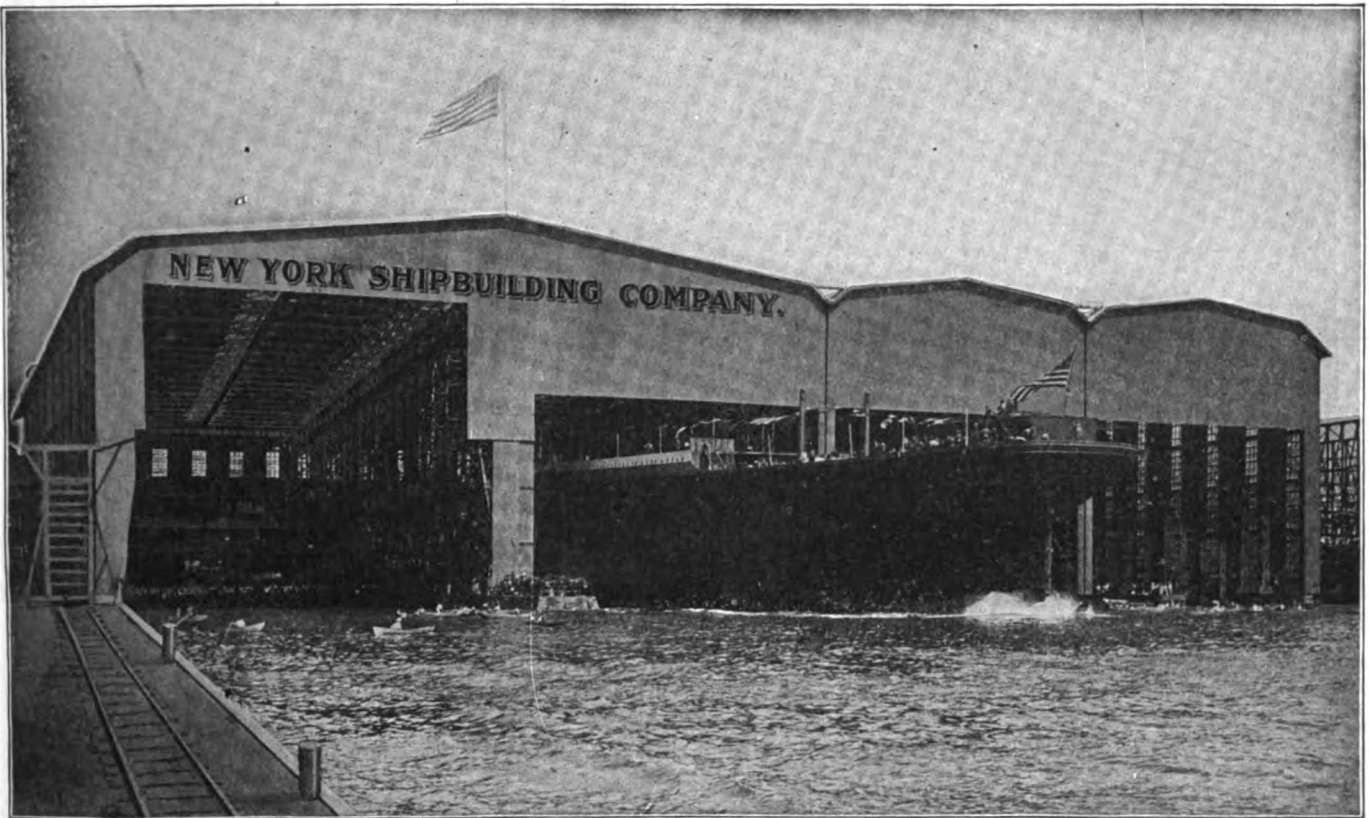
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HEAVY MACHINERY**



Launch of "Mongolia," Pacific Mail S. S. Co., July 25, 1903.  
615 feet long, 65 feet beam, 51 feet deep.

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**WARSHIPS AND MERCHANT STEAMERS**  
Pumping, Blowing and Hoisting Engines, Dry Docks  
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Repairs to all classes  
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Made to suit the water as per analysis, used regularly, keeps boilers free from scale and prevents any corrosive action the boiler water may have on the iron.

Economy of operation is possible only with clean boilers.

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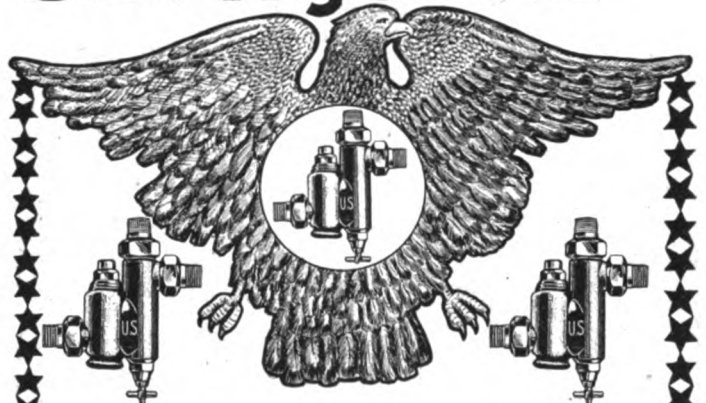
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Injectors and Engine Room Specialties are upheld by over 450,000 engineers as the standard automatic injector of the world.

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6' x 10' FLOAT. WEIGHT 465 LBS.

**METALLIC LIFE BOATS.**

**Every Time a Man Doesn't Say Anything  
He Lessens His Chances of Being  
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At practically the same price per person allowed, we can furnish a **Raft** that will save **75%** in deck space, **50%** in weight, and **90%** in cost of maintenance.

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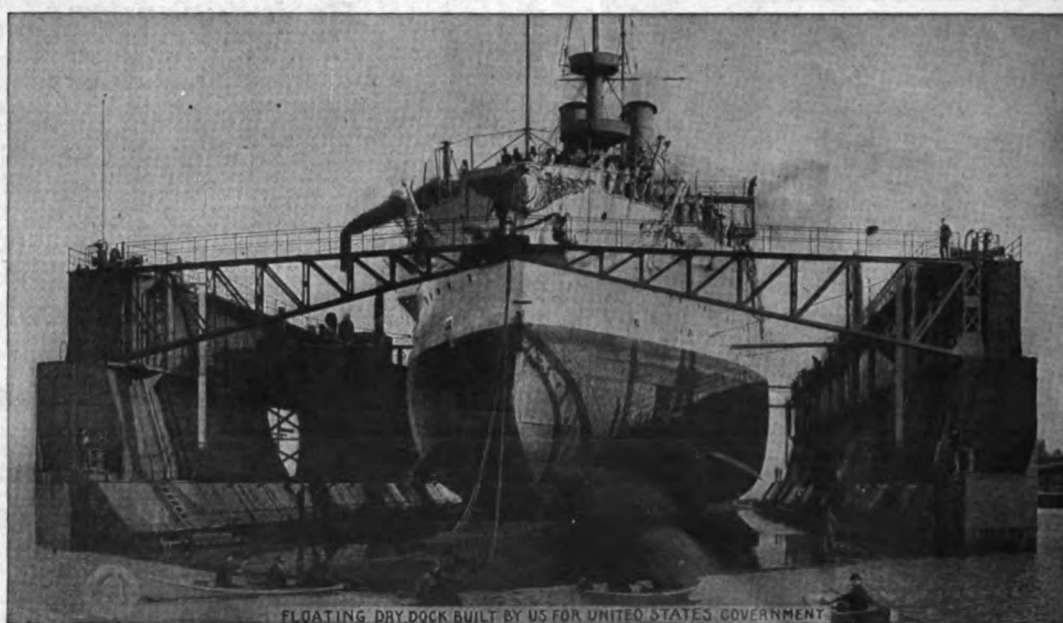
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BUILDERS OF STEEL STEAMSHIPS,  
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OF EVERY DESCRIPTION

STEEL FLOATING DRY DOCKS  
CAPABLE OF DOCKING  
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PATENTED IN U. S. AND FOREIGN COUNTRIES.

This packing is giving perfect satisfaction on all styles of rods on marine and stationary engines, locomotives and air compressors, and works perfectly on all sizes of rods from the highest to the lowest pressure. A glance at the above cut will show that the packing is arranged so that it adjusts itself to the rod and gives the rod a high polish and reduces the friction to a minimum.

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For ships' officers, yachtsmen, seamen, etc., it is the ideal waterproof garment.

"Raino" is very light, clean and neat looking. Far superior to either oilskins or rubber. It will not rot, nor is it stiff, heavy, oily or foul smelling.

After two years of the hardest kind of army and naval service tests in all parts of the world hundreds of officers declare it the most durable waterproof garment made.

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Write for prices on Uniforms.

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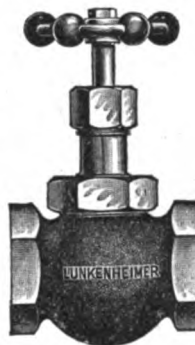
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The Embodiment of Perfection



Self contained. No extra parts required to repair them when worn. A few minutes spent in regrinding and they are as good as new.

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"Otis" Fire Box Plates a Specialty.

**STEEL CASTINGS FROM 100 TO 100,000 LBS.**

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**Designers and Builders of  
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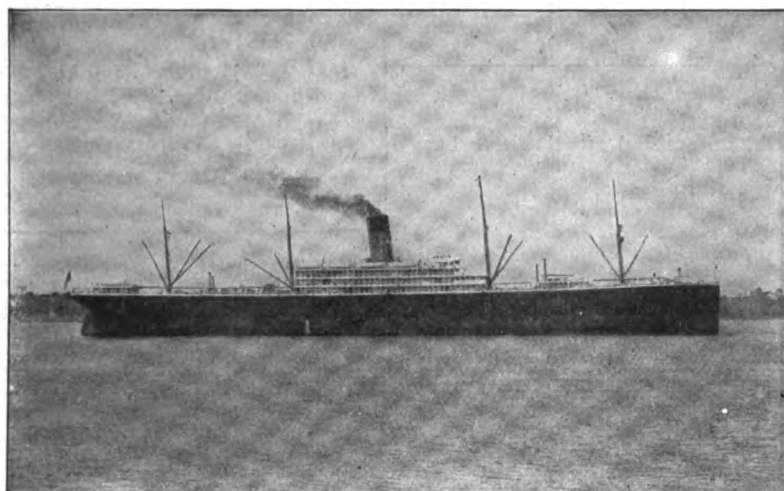


**STEAMER "WILLIAM P. SNYDER,"**

**550 Feet Long, 56 Feet Beam.**

Designed and built by us and equipped with patented hawse pipes which permits the anchors being stowed very snugly, bringing them practically flush with outside of the hull. Expensive and serious damage in case of collision is avoided by use of this improvement.

# Hyde Windlasses and Capstans



Steamship Minnesota equipped with Hyde Windlass and Capstans.

Selected for the Minnesota and Dakota of the Great Northern Steamship Co.'s fleet—the largest vessels ever built in the United States. They are also being installed on nearly all of the vessels now building for the Navy Department, Revenue Cutter service, Lighthouse Board and the United States Coast Survey.

*Reason—Their Superiority*

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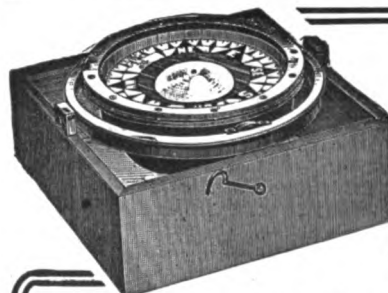
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**Ritchie  
Liquid  
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The Standard Liquid Compass used exclusively by the U. S. Navy for over 35 years. Over 25,000 used in Merchant Service.

Made in all sizes and styles, from 2 to 12 inches diameter of card. All compasses made by us have our name printed below the North point or prominently upon the card. **None other are genuine.** Latest form with four or six needles, the best instrument for iron ships. For sale by ship chandlers and nautical instrument dealers. Catalogue free.

**E. S. RITCHIE & SONS, Brookline, Mass., U. S. A.**  
MANUFACTURERS OF NAUTICAL AND PHYSICAL APPARATUS.

# WANTED and FOR SALE Department.

## PROPOSALS.

U. S. Engineer Office, Milwaukee, Wis., June 28, 1906. Sealed proposals for removing old piers and building pile piers, Manitowoc Harbor, Wis., will be received here until 3 P. M. standard time, July 30, 1906, and then publicly opened. Information furnished on application. W. V. Judson, Major, Engrs.

S. Engineer Office, Jones Building, Detroit, Mich., June 4, 1906. Sealed proposals for widening St. Marys' Falls Canal will be received at this office until 2 p. m., July 24, 1906, and then publicly opened. Information furnished on application. Chas. E. L. B. Davis, Col. Engrs.

**DESIGNS FOR BATTLESHIPS.** The Navy Department invites the attention of competent naval constructors in the United States to the opportunity afforded by the Act of Congress (Public No. 336) to submit plans and specifications for a battleship. Preliminary plans will be received under seal on November 1, 1906, which preliminary plans, with the attendant specifications shall show the displacement, draught, and dimensions of the battleship proposed and the speed and estimated cost and likewise within what time completed plans and specifications for the construction of such vessel will be furnished, if desired by the Department, and finally, what amount will be deemed by the said constructor just and equitable compensation for the said preliminary and the said completed plans, should the same or either of the same be paid for by the Department in accordance with the terms of the statute aforesaid. A copy of the Departmental circular on the subject will be sent on request addressed to the Navy Department, Washington, D. C. Charles J. Bonaparte, Secretary of the Navy.

Proposals for dredges.—U. S. Engineer Office, Custom House, St. Louis, Mo., July 18, 1906. Sealed proposals, in triplicate, for construction and delivery of two self-propelling hydraulic dredges and their pontoon pipe lines will be received here until 12 noon, standard time, August 20, 1906, and then publicly opened. Information furnished on application. Thomas L. Casey, Major, Engrs.

## For Sale.

Five Scotch Boilers, allowed 160 lbs. steam. Good as new. ERIE MACHINERY CO., 729 Garfield Bldg., Cleveland, O.

## For Sale.

1,000 h. p. fore and aft Neafie & Levy compound Engine; surface condenser; independent pumps.  
Two 12-foot Scotch Boilers.  
One 13½-foot Scotch Boiler.  
One 10 16-25 x 16 triple expansion Engine.  
Three 150-h. p. Almy Boilers.  
One 200-h. p. Tregurtha Boiler.  
One 14 30 x 24 fore and aft Engine and condenser.  
One Williamson steering Engine.  
One 10 k. w. electric lighting Set.  
One 15 k. w. electric lighting Set.  
One Providence Windlass, 50 fathoms 1½ in. chain.  
Two thrust Shafts and Bearings, 8½ in. diameter.

MARVIN BRIGGS,  
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## Steamer T. S. Christie.

Length 160 ft.; beam 30 ft.; carrying capacity, lumber 525,000 ft., coal 800 tons. Rating in Inland Lloyds Register, A1½\*, valuation \$22,000. For price and particulars address Capt. P. Larsen, Box 249, Chicago, Ill.

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Steamer E. F. Gould, length 137 ft., width 28 ft., depth 8 ft. 5 in., tonnage 261 tons. Boiler, engine and hull in go d condition. First-class, complete sand pumping outfit now installed on boat, will sell with boat if so desired. Apply

JOHN M. MCKERCHEY,  
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## FOR SALE.

Three yard clam shell dredge in fine order rigged to work as dipper machine.

Machinery for one other dredge. 14 x 16 tug. Lying at River Rouge, Mich.

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### For Sale or Charter for the Season.

Commodious Steam Yacht, 75 ft. long, 18 ft. beam, 6½ depth of hold. Two staterooms and finest outfit, including electric light plant, search light, and power launch. Triple expansion engine, safety boiler. Cheap and easy steamer. Inquire of R. J. Cram, Port Huron, Mich.

## GREAT LAKES REGISTER

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CLASSIFICATION OF STEEL AND WOODEN VESSELS.



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PLANS AND SPECIFICATIONS FURNISHED.

GREAT LAKES REGISTER SURVEYORS ARE ESTABLISHED AT ALL THE PRINCIPAL PORTS ON THE GREAT LAKES.

F. D. HERRIMAN, SURVEYOR GENERAL,  
320-322 Perry-Payne Building, CLEVELAND, O.

## Centrifugal Dredge For Sale

(Canadian)

Twelve inch suction and discharge. Fore and aft compound engine. All in first class condition.

For particulars address:

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## CHAS. E. & W. F. PECK,

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C. T. BOWRING & CO., (Insurance) LTD.,

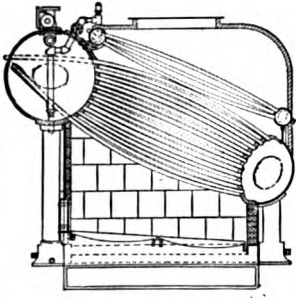
5 and 6 Billiter Ave., LONDON,  
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**HULLS and CARGOES.**

We place insurances in the most advantageous markets, employing, in the interest of our clients and with equal facility, all Foreign and Home companies, at the best procurable rates and terms.

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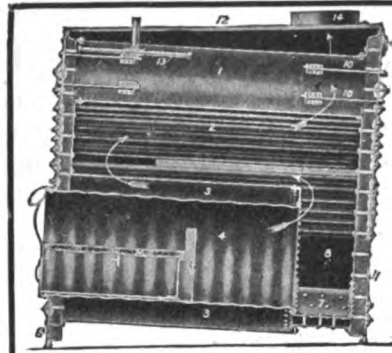


**THE MOSHER PATENT WATERTUBE BOILER**

Simplest, lightest most compact boiler made. Most accessible for cleaning and repair. Five vertical rows or as many as 45 tubes may be cleaned or withdrawn by removing the cover from a single hand hole. Largest grate surface on a given floor space. No joints in the fire. All joints expanded. Greater steam room and water capacity than any other boiler. Built in sizes up to 2000 H. P. Mosher Boilers have been supplied for eleven torpedo boats and the monitor Florida of the U. S. Navy, amounting to over 26,000 H. P., six torpedo boats for the Russian Navy two gun boats for the Mexican government, one cruiser and one torpedo boat for the Brazilian government; the steam yachts Arrow, Elide, Feiseen, Wauneta, Presto, and numerous other yachts and vessels.

SEND FOR DESCRIPTIVE CATALOGUE.

**MOSHER WATERTUBE BOILER CO., No. 1 Broadway, N. Y.**

**Detroit Scotch Water Tube Boiler**

Internally Fired.

Scotch and Water Tube types combined, eliminating all objections.

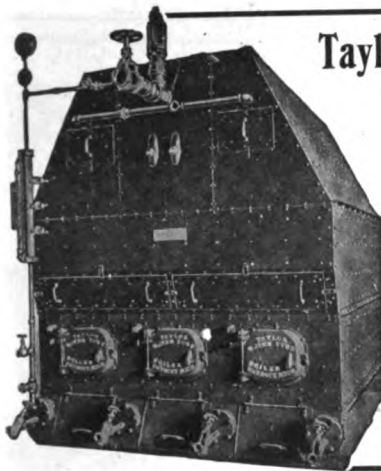
Half the weight of ordinary Scotch boilers.

Standard corrugated furnaces.

Patent applied for.

Investigate before buying any other.

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Detroit, Mich.

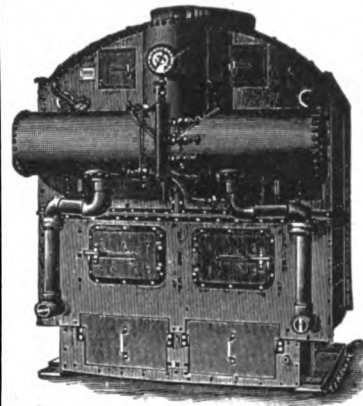
**Taylor Water Tube Boiler Co.**

Vertical Tubes, sectional, large steam space and liberating area.

Fire box, combustion chamber, and course for the furnace gases similar to the Scotch Marine. Free circulation type.

Send for full description.

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**DETROIT, MICH**

**350 STEAM VESSELS**

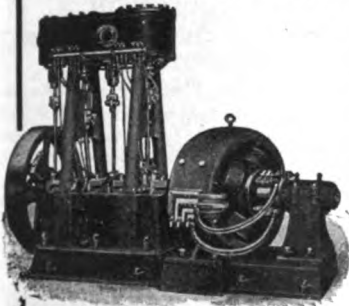
Now Equipped With

**ALMY'S PATENT**  
**SECTIONAL**  
**Water Tube Boilers**

Bear Evidence of Their  
**Excellent Qualities**

**ALMY WATER-TUBE**  
**BOILER CO.**  
PROVIDENCE, R. I.

We offer an  
**Engine for Direct-Connected Electric Plants**



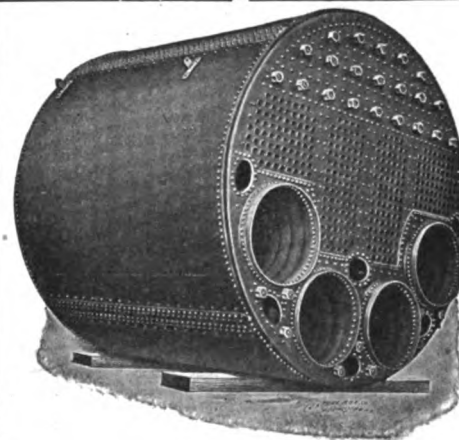
which we can guarantee to stand up under extreme changes from no load to full load, and to REGULATE TO PERFECTION.

That its construction is strong is self-evident. The shaft, rods, valve stems and other working parts are made of forged steel.

Every bearing is automatically lubricated. In finish it is all that can be desired.

Write for full particulars and tests.

**John E. Thropp & Sons' Co.**  
TRENTON, N. J.

**MARINE BOILERS**

OF ALL TYPES

**KINGSFORD**  
**FOUNDRY &**  
**MACHINE**  
**WORKS,**

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Manufactured by

**L. M. BOWERS & CO.,**

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Catalogue on Application.



The National and International

**ANCHORS.**

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**The Upson-Walton Co.,**

CLEVELAND, O.

**Northwestern Steam Boiler & Mfg. Co.**

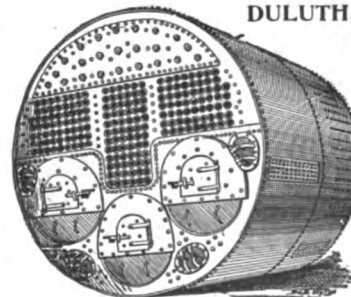
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Manufacturers of

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Special facilities for Marine Work. Repairs promptly attended to Night or Day.

We carry a complete line of Marine and Engineers' Supplies.



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RESIDENCE CALLS: M. A. RYAN, Pres. and Gen'l Mgr., 776-R.  
J. H. OPPERMAN, Secretary, 579-R; E. KRIZ, Superintendent, 557-M.

# BUYERS' DIRECTORY OF THE MARINE TRADE.

For a more complete classification than that represented by advertisers in The Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, Marine and Naval Directory of the United States, published by The Marine Review, Cleveland.

[See accompanying Index of Advertisers for full addresses of concerns in this Directory.]

## AIR COMPRESSION, HOISTS, ETC.

Great Lakes Engineering Works....  
.....Detroit.

## AIR PORTS, DEAD LIGHTS, ETC.

Marine Mfg. & Supply Co.....  
.....New York.

## AIR PUMPS AND APPLIANCES.

Fore River Ship & Engine Co.....  
.....Quincy, Mass.  
Great Lakes Engineering Works....  
.....Detroit.

## ANCHORS.

Bowers, L. M. & Co.....  
.....Binghamton, N. Y.

## ANTI-FRICTION METALS.

Cramp, Wm. & Sons....Philadelphia.

## ARTIFICIAL DRAFT FOR BOILERS.

American Ship Building Co.....  
.....Cleveland.  
Detroit Ship Building Co....Detroit.  
Great Lakes Engineering Works....  
.....Detroit.

## ASH EJECTORS.

Great Lakes Engineering Works....  
.....Detroit.

## ATTORNEYS AND PROCTORS IN ADMIRALTY.

Gilchrist, Albert J.....Cleveland.  
Goulder, Holding & Masten.....  
.....Cleveland.  
Hoyt, Dustin & Kelley....Cleveland.  
Jenkins, Russell & Eichelberger....  
.....Cleveland.  
Kremer, C. E. ....Chicago.  
MacDonald, Ray G.....Chicago.  
Shaw, Warren, Cady & Oakes.....  
.....Detroit.  
White, Johnson, McCaslin & Cannon  
.....Cleveland.

## BAROMETERS, MARINE GLASSES, ETC.

Ritchie, E. S. & Sons.....  
.....Brookline, Mass.

## BELTING (LEATHER.)

Republic Belting & Supply Co.....  
.....Cleveland.

## BLOCKS, SHEAVES, ETC.

Boston Lockport Block Co.....  
.....Boston, Mass.

## BOAT BUILDERS.

Drein, Thos. & Son.....  
.....Wilmington, Del.  
Kahnweiler's Sons, David.....  
.....New York.  
Marine Construction & D. D. Co..  
.....Mariner's Harbor, S. I., N. Y.  
Truscott Boat Mfg. Co.....  
.....St. Joseph, Mich.

## BOILER COMPOUNDS.

The Bird-Archer Co.....New York  
Dearborn Drug & Chemical Works..  
.....Chicago.  
State Manufacturing Co...Cleveland.

## BOILER MANUFACTURERS.

Almy Water Tube Boiler Co.....  
.....Providence, R. I.

## BOILER MANUFACTURERS—Continued.

American Ship Building Co.....  
.....Cleveland.  
Atlantic Works..East Boston, Mass.  
Chicago Ship Building Co..Chicago.  
Cramp, Wm. & Sons..Philadelphia.  
Dearing Water Tube Boiler Co....  
.....Detroit.  
Detroit Ship Building Co....Detroit.  
East End Boiler Works....Detroit.  
Fletcher, W. A. & Co.....  
.....Hoboken, N. J.  
Fore River Shipbuilding Co.....  
.....Quincy, Mass.  
Great Lakes Engineering Works....  
.....Detroit.  
Kingston Foundry & Machine  
Works .....Oswego, N. Y.  
Maryland Steel Co.....  
.....Sparrow's Point, Md.  
Milwaukee Dry Dock Co.....  
.....Milwaukee.  
Mosher Water Tube Co..New York.  
Newport News Ship Building Co..  
.....Newport News, Va.  
New York Shipbuilding Co.....  
.....Camden, N. J.  
Northwestern Steam Boiler & Mfg.  
Co.....Duluth, Minn.  
Quintard Iron Works Co.....  
.....New York.  
Roberts Safety Water Tube Boiler  
Co. ....New York.  
Superior Ship Building Co.....  
.....Superior, Wis.  
Taylor Water Tube Boiler Co....  
.....Detroit.  
Toledo Ship Building Co.....Toledo.

## BOILER RIVETS.

Bourne-Fuller Co.....Cleveland.

## BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....  
.....Cuyahoga Falls, O.

## BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons....Philadelphia.  
Fore River Ship & Engine Co.....  
.....Quincy, Mass.  
Great Lakes Engineering Works..  
.....Detroit.  
Lunkenheimer Co.....Cincinnati.

## BRIDGES, BUILDERS OF.

Scherzer Rolling Lift Bridge Co....  
.....Chicago.

## BUCKETS, ORE AND COAL.

Brown Hoisting & Conveying Ma-  
chine Co.....Cleveland.

## CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co.....Cleveland.

## CANVAS SPECIALTIES.

Baker & Co., H. H.....Buffalo.  
Bunker, E. A.....New York.  
Upson-Walton Co.....Cleveland.  
Republic Belting & Supply Co....  
.....Cleveland.

## CAPSTANS.

American Ship Windlass Co.....  
.....Providence, R. I.  
Dake Engine Co.....  
.....Grand Haven, Mich.  
Hyde Windlass Co.....Bath, Me.  
Marine Mfg. & Supply Co.....  
.....New York.

## CEMENT, IRON FOR REPAIR-ING LEAKS.

Smooth-On Mfg. Co.....  
.....Jersey City, N. J.

## CHAIN SURVEYORS, HOISTS.

Brown-Hoisting Machinery Co.....  
.....Cleveland.  
General Electric Co.....  
.....Schenectady, N. Y.

## CHAIN HOISTS.

Boston & Lockport Block Co.....  
.....Boston, Mass.  
Republic Belting & Supply Co.....  
.....Cleveland, O.

## CHARTS.

Penton Publishing Co....Cleveland

## CLOCKS (Marine and Ship's Bell) AND CHRONOMETERS.

Ritchie, E. S. & Sons.....  
.....Brookline, Mass.

## COAL PRODUCERS AND SHIPPERS.

Hanna, M. A. & Co.....Cleveland.  
Pickands, Mather & Co....Cleveland.  
Pittsburg Coal Co.....Cleveland

## COAL AND ORE HANDLING MACHINERY.

Brown-Hoisting Machinery Co.....  
.....Cleveland.

## COMPASSES.

Ritchie, E. S. & Son.....  
.....Brookline, Mass.

## CONDENSERS.

Great Lakes Engineering Works....  
.....Detroit.  
Thropp & Sons Co., John E.....  
.....Trenton, N. J.  
Wheeler Condenser & Engineering  
Co.....New York.

## CONTRACTORS FOR PUBLIC WORKS.

Breyman Bros., G. H.....Toledo.  
Buffalo Dredging Co.....Buffalo.  
Dunbar & Sullivan Dredging Co....  
.....Buffalo.  
Great Lakes Dredge & Dock Co...  
.....Chicago.  
Hickler Bros.....  
.....Sault Ste. Marie, Mich.  
Hubbell Co., H. W..Saginaw, Mich.  
Smith Co., L. P. & J. A...Cleveland.  
Starke Dredge & Dock Co., C. H...  
.....Milwaukee.  
Standard Contracting Co..Cleveland.  
Sullivan, M.....Detroit.

## CORDAGE.

Baker & Co., H. H.....Buffalo.  
Upson-Walton Co.....Cleveland.

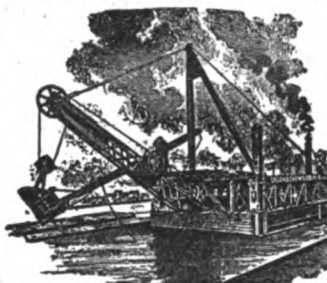
## G. H. Breymann & Bro's

### CONTRACTORS FOR PUBLIC WORKS

Dredging, Dock Building, Etc.

5, 6 AND 7 MARINE BUILDING  
TOLEDO, OHIO.

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OWNS AND OPERATES THE PLANTS  
OF THE FORMER COMPANIES:

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Hausler & Lutz Co.  
Green's Dredging Co.  
Chicago Star Con. & D. Co.  
McMahon & Montgomery Co.  
Chicago Dredging & Dock Co.  
Griffith, McDermott & Watt  
Dredging Co.  
Duluth Dredge & Dock Co.  
Lake Superior Contracting &  
Dredging Co.

Contractors for

### RIVER AND HARBOR IMPROVEMENTS.

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## Buffalo Dredging Co.

### GENERAL CONTRACTORS —ON— SUBMARINE WORK

Office  
D. S. Morgan Bldg.

BUFFALO, N. Y.

## Hickler Brothers

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Capacity, 1,000 tons. Draft, 7½ ft.  
forward, 13½ ft. aft. Length on  
keel blocks, 180 ft.; over all, 190 ft.

Machine Shop, Foundry and Steam Forge,  
Dredges, Drill Boats and Derrick Scows.

## DUNBAR & SULLIVAN DREDGING CO.

Ready for Spring

A New Tool

### A REVOLVING CLAMSHELL DREDGE

which will do the following impossi-  
bilities to the ordinary dredge:

Excavate 60' back from face of dock into scow or vice versa.  
Excavate at either end of itself and dump in scow at other  
end. This makes through cutting and cleaning narrow slips  
cheaply possible. Excavate trenches to 150' or more depth.  
Excavate material and throw it one side 150' from original  
site where there is four feet of water between dump and  
channel. Excavate shallow channels down to 4' x 44'.  
Clean out boulders or obstructions without disturbing sur-  
rounding bottom. Excavate close to docks without injury  
to dock. Anything that ordinary derrick will do up to 10  
tons at 75' radius.

This is an excellent wrecking tool.

## H. W. HUBBELL CO.

### Submarine Work of all kinds

Dredging Hard Material a Specialty.

SAGINAW

MICH.

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Popular among young men in the engine departments of ships is  
"Engineers' Examinations with Questions and Answers"  
Sells at \$2.00, which is the cost delivered, of the following works:

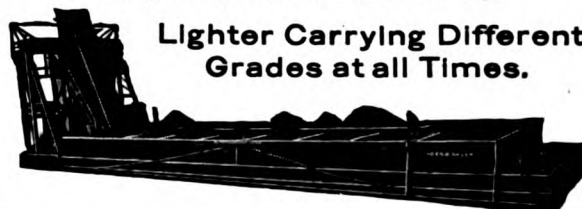
Hawkins' New Catechism of Electricity.  
Hawkins' Maxims and Instructions for the Boiler Room.  
Hawkins' Hand Book of Calculations for Engineers.  
Hawkins' New Catechism of the Steam Engine.

THE MARINE REVIEW, CLEVELAND.

### Steamboat Fuel at Ashtabula.

Large Supplies of Best Quality.

Lighter Carrying Different  
Grades at all Times.



Fuel Scow with elevators and discharging spouts. Storage of 800 tons.  
Discharges 250 tons an hour into steamers while unloading cargo.

**M. A. Hanna & Co., Miners and Shippers,**  
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## Buyers' Directory of the Marine Trade.—Continued.

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Armstrong Cork Co., Pittsburg, Pa.  
Kahnweiler's Sons, D., New York.

### CRANES, TRAVELING.

Brown-Hoisting Machinery Co.,  
Cleveland.

### DIVING APPARATUS.

Morse, A. J. & Son, Boston.  
Schrader's Son, Inc., A., New York.

### DREDGING CONTRACTORS.

Breyman & Bros., G. H., Toledo.  
Buffalo Dredging Co., Buffalo.  
Dunbar & Sullivan Dredging Co.,  
Buffalo.  
Great Lakes Dredge & Dock Co.,  
Chicago.  
Hickler Bros.,  
Sault Ste. Marie, Mich.  
Hubbell Co., H. W., Saginaw, Mich.  
Smith Co., L. P. & J. A., Cleveland.  
Starke Dredge & Dock Co., C. H.,  
Milwaukee.  
Sullivan, M., Detroit.

### DREDGING MACHINERY.

Quintard Iron Works Co., New York.

### DRY DOCKS.

American Ship Building Co.,  
Cleveland.  
Atlantic Works, East Boston, Mass.  
Buffalo Dry Dock Co., Buffalo.  
Chicago Ship Building Co.,  
Chicago.  
Cramp, Wm. & Sons, Philadelphia.  
Detroit Ship Building Co.,  
Detroit.  
Great Lakes Engineering Works,  
Detroit.  
Lockwood Mfg. Co.,  
East Boston, Mass.  
Milwaukee Dry Dock Co.,  
Milwaukee.  
Newport News Ship Building Co.,  
Newport News, Va.  
Shipowners' Dry Dock Co., Chicago.  
Superior Ship Building Co.,  
Superior, Wis.  
Tietjen & Lang Dry Dock Co.,  
Hoboken, N. J.  
Toledo Ship Building Co., Toledo.

### DREDGE BUILDERS.

Manitowoc Dry Dock Co.,  
Manitowoc, Wis.

### DYNAMOS.

General Electric Co.,  
Schenectady, N. Y.  
Thropp & Sons, John E.,  
Trenton, N. J.

### ELECTRIC HOISTS AND CRANES.

General Electric Co.,  
Schenectady, N. Y.

### ELECTRIC LIGHT AND POWER PLANTS.

General Electric Co.,  
Schenectady, N. Y.  
Thropp & Sons, John E.,  
Trenton, N. J.

### ENGINE BUILDERS, MARINE.

American Ship Building Co.,  
Cleveland.  
Atlantic Works, East Boston, Mass.  
Chicago Ship Building Co., Chicago.  
Chase Machine Co., Cleveland.  
Cramp, Wm. & Sons, Philadelphia.  
Detroit Ship Building Co., Detroit.  
Fletcher, W. & A. Co., Hoboken, N. J.  
Fore River Shipbuilding Co.,  
Quincy, Mass.

### ENGINE BUILDERS—Continued.

Great Lakes Engineering Works,  
Detroit, Mich.  
Hall Bros., Philadelphia.  
Lockwood Mfg. Co.,  
East Boston, Mass.  
Maryland Steel Co.,  
Sparrows Point, Md.  
Milwaukee Dry Dock Co., Milwaukee.  
Mosher, Chas. D., New York.  
Newport News Ship Building Co.,  
Newport News, Va.  
New York Ship Building Co.,  
Camden, N. J.  
Northwestern Steam Boiler & Mfg.  
Co., Duluth, Mich.  
Quintard Iron Works Co., New York.  
Roach's Ship Yard, Chester, Pa.  
Sheriffs Mfg. Co., Milwaukee.  
Superior Ship Building Co.,  
Superior, Wis.  
Thropp, J. E. & Sons Co.,  
Trenton, N. J.  
Toledo Ship Building Co., Toledo.  
Trout, H. G., Buffalo.

### ENGINE ROOM TELEGRAPH CALL BELLS, ETC.

Cory, Chas. & Son, New York.  
Marine Mfg. Supply Co., New York.

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Lunkenheimer Co., Cincinnati.  
Northwestern Steam Boiler & Mfg.  
Co., Duluth, Minn.

### ENGINEERS, MARINE, MECHANICAL, CONSULTING.

Hynd, Alexander, Cleveland.  
Hunt, Robt. W. & Co., Chicago.  
Kidd, Joseph, Duluth, Minn.  
Mosher, Chas. D., New York.  
Nacey, James, Cleveland.  
Roelker, H. B., New York.  
Wood, W. J., Chicago.

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Ross Valve Co., Troy, N. Y.  
Wheeler Condenser & Engineering  
Co., New York.

### FIXTURES FOR LAMPS, OIL OR ELECTRIC.

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Schenectady, N. Y.

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Cleveland.  
Fore River Shipbuilding Co.,  
Quincy, Mass.

### FLUE WELDING.

Fix's S. Sons, Cleveland.

### FUELING COMPANIES AND COAL DEALERS.

Hanna, M. A. & Co., Cleveland.  
Parker Bros. Co., Ltd., Detroit.  
Pickands, Mather & Co., Cleveland.  
Pittsburg Coal Co., Cleveland.  
Smith, Stanley B., & Co., Detroit.

### FURNACES FOR BOILERS.

Continental Iron Works, New York

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Safety Car Heating & Lighting Co.,  
New York.

### GAS AND GASOLINE ENGINES.

Chase Machine Co., Cleveland.

### GAUGES, STEAM AND VACUUM.

Lunkenheimer Co., Cincinnati.

### GAUGES, WATER.

Lunkenheimer Co., Cincinnati, O.

### GENERATING SETS.

General Electric Co.,  
Schenectady, N. Y.

### GRAPHITE.

Dixon Crucible Co., Joseph,  
Jersey City, N. J.

### HAMMERS, STEAM.

Chase Machine Co., Cleveland.

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American Ship Building Co.,  
Cleveland.  
Brown Hoisting Machinery Co.,  
Cleveland.  
Chase Machine Co., Cleveland.  
Dake Engine Co.,  
Grand Haven, Mich.  
General Electric Co., New York.  
Hyde Windlass Co., Bath, Me.  
Marine Iron Co., Bay City.

### HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co.,  
Cuyahoga Falls, O.

### HYDRAULIC DREDGES.

Great Lakes Engineering Works,  
Detroit.

### HYDRAULIC TOOLS.

Watson-Stillman Co., The,  
New York.

### ICE MACHINERY.

Great Lakes Engineering Works,  
Detroit.  
Roelker, H. B., New York.

### INJECTORS.

American Injector Co., Detroit.  
Jenkins Bros., New York.  
Lunkenheimer Co., Cincinnati.  
Penberthy Injector Co.,  
Detroit, Mich.

### INSURANCE, MARINE.

Elphicke, C. W. & Co., Chicago.  
Gilchrist & Co., C. P., Cleveland.  
Hawgood & Co., W. A., Cleveland.  
Helm & Co., D. T., Duluth.  
Hutchinson & Co., Cleveland.  
McCarthy, T. R., Montreal.  
McCurdy, Geo. L., Chicago.  
Mitchell & Co., Cleveland.  
Parker Bros. Co., Ltd., Detroit.  
Peck, Chas. E. & W. F.,  
New York and Chicago.  
Prindiville & Co., Chicago.  
Richardson, W. C., Cleveland.  
Sullivan, D. & Co., Chicago.

## The Cleveland Dredge & Dock Co.

Successors to  
The L. P. & J. A. SMITH COMPANY

**CONTRACTORS FOR PUBLIC WORKS  
AND ALL KINDS OF DOCK AND  
HARBOR IMPROVEMENTS**

Offices: Williamson Bldg. CLEVELAND, O.

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**ENGINEERS AND CONTRACTORS**

For Railroads, Dredging, Dock Build-  
ing, Concrete, Submarine work, &c.

Wade Building

Cleveland, Ohio

## C. H. STARKE DREDGE & DOCK CO.,

**Contractors for Public Works.**

**DREDGING, PILE DRIVING,  
—AND—  
SUBMARINE PIPE LAYING.**

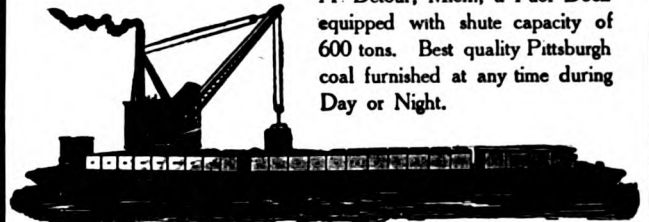
Canal Street, West of First Avenue,

Milwaukee, - - Wisconsin.

## PICKANDS, MATHER & CO.

FUEL LIGHTERS at Buffalo, Erie, Ashtabula and Cleveland.

A. Detour, Mich., a Fuel Dock  
equipped with chute capacity of  
600 tons. Best quality Pittsburgh  
coal furnished at any time during  
Day or Night.



Western Reserve Building,

CLEVELAND, O.

## N. SULLIVAN, DREDGING OF ALL KINDS.

**THE REMOVING OF DEEP  
WATER EARTH AND ROCK  
A SPECIALTY.**

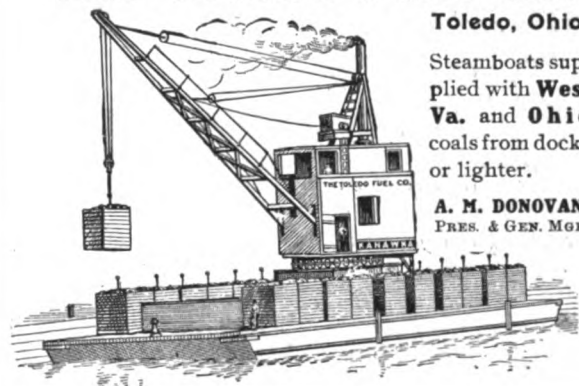
53 Woodward Ave. Terrace,  
DETROIT, - - - MICH.

## The Toledo Fuel Co.

Toledo, Ohio

Steamboats sup-  
plied with **West  
Va. and Ohio**  
coals from docks  
or lighter.

**A. M. DONOVAN,**  
PRES. & GEN. MGR.



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Via  
**BIG FOUR ROUTE**

Leaves Union Station 6:15 p. m., daily except Sunday, with  
combination Baggage and Smoking Car, highback coaches  
and Pullman Buffet Parlor Cars (serving light supper en-  
route), Stopping at Wellington, New London, Shelby,  
Crestline, Galion and Delaware and arrives at Columbus  
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**Self-Igniting Inextinguishable  
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| Life Saving     | Salvage       |
| Distress Signal | Submarine     |
| Repairs and     | General       |
| Construction.   | Illumination. |

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**THE MARINE TORCH CO.**

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Especially approved by The British Board of Trade, either of  
Life Buoy Lights or Deck Flare.

## Buyers' Directory of the Marine Trade---Continued.

**IRON ORE AND PIG IRON.**

Bourne-Fuller Co.....Cleveland, O.  
Hanna, M. A. & Co.....Cleveland.  
Pickands, Mather & Co., Cleveland.

**LAUNCHES—STEAM, NAPHTHA, ELECTRIC.**

Truscott Boat Mfg. Co.....  
.....St. Joseph, Mich.

**LIFE PRESERVERS, LIFE BOATS, BUOYS.**

Armstrong Cork Co.....Pittsburg.  
Carley Life Float Co.....  
.....New York, N. Y.  
Drein, Thos. & Son.....  
.....Wilmington, Del.  
Kahnweiler's Sons, D.....New York.

**LIGHTS, SIDE AND SIGNAL.**

Russell & Watson.....Buffalo.

**LOGS.**

Nicholson Ship Log Co., Cleveland.  
Walker & Sons, Thomas.....  
.....Birmingham, Eng.

**LUBRICATING GRAPHITE.**

Dixon Crucible Co., Joseph.....  
.....Jersey City, N. J.

**LUBRICATORS.**

Lunkenheimer Co. .... Cincinnati.

**LUMBER.**

Martin-Barriss Co. .... Cleveland.

**MACHINISTS.**

Chase Machine Co.....Cleveland.  
Hickler Bros., Sault Ste. Marie, Mich.  
Lockwood Mfg. Co.....  
.....East Boston, Mass.

**MACHINE TOOLS (WOOD WORKING).**

Atlantic Works, Inc....Philadelphia.

**MARINE RAILWAYS.**

Hickler Bros., Sault Ste. Marie, Mich.

**MARINE RAILWAYS, BUILDERS OF.**

Crandall & Son, H. I.....  
.....East Boston, Mass.

**MATTRESSES, CUSHIONS, BEDDING.**

Fogg, M. W.....New York

**MECHANICAL DRAFT FOR BOILERS.**

American Ship Building Co.....  
.....Cleveland.  
Detroit Ship Building Co., Detroit.  
Great Lakes Engineering Works...  
.....Detroit.

**METALLIC PACKING.**

Katzenstein, L. & Co., New York.  
The National Metallic Packing Co..

**MOTORS, GENERATORS—ELECTRIC.**

General Electric Co.....  
.....Schenectady, N. Y.

**NAUTICAL INSTRUMENTS.**

Ritchie, E. S., & Sons.....  
.....Brookline, Mass.

**NAVAL ARCHITECTS.**

Hynd, Alexander .....Cleveland  
Kidd, Joseph .....Duluth, Minn.  
Mosher, Chas. D.....New York.  
Nacey, James .....Cleveland  
Wood, W. J.....Chicago

**OAKUM.**

Stratford, Oakum Co.....  
.....Jersey City, N. J.

**OILS AND LUBRICANTS.**

Dixon Crucible Co., Joseph.....  
.....Jersey City, N. J.

**PACKING.**

Jenkins Bros.....New York.  
Katzenstein, L. & Co.....New York.  
Robertson, Jos. L. & Sons.....  
.....New York.  
The National Metallic Packing Co..  
.....Oberlin, O.  
Republic Belting & Supply Co.....  
.....Cleveland, O.

**PAINTS.**

Baker, Howard H. & Co....Buffalo.  
Upson-Walton Co.....Cleveland.

**PATTERN SHOP MACHINERY.**  
Atlantic Works, Inc. ..Philadelphia.

**PILE DRIVING AND SUBMARINE WORK.**

Buffalo Dredging Co.....Buffalo.  
Dunbar & Sullivan Dredging Co...  
.....Buffalo.  
Great Lakes Dredge & Dock Co....  
.....Chicago.  
Hickler Bros., Sault Ste. Marie, Mich.  
Hubbell Co., H. W....Saginaw, Mich.  
Parker Bros. Co., Ltd.....Detroit.  
Smith Co., L. P. & J. A....Cleveland.  
Starke Dredge & Dock Co., C. H...  
.....Milwaukee.  
Sullivan, M.....Detroit.

**PIPE, WROUGHT IRON.**

Bourne-Fuller Co.....Cleveland, O.

**PLANING MILL MACHINERY.**  
Atlantic Works, Inc....Philadelphia.

**PLATES—SHIP, STRUCTURAL, ETC.**

Bourne-Fuller Co.....Cleveland, O.  
Otis Steel Co.....Cleveland.

**PRESSURE REGULATORS.**

Ross Valve Co.....Troy, N. Y.

**PROPELLER WHEELS.**

American Ship Building Co.....  
.....Cleveland.  
Atlantic Works ..East Boston, Mass.  
Cramp, Wm. & Sons..Philadelphia.  
Detroit Ship Building Co....Detroit.  
Fore River Shipbuilding Co.....  
.....Quincy, Mass.  
Great Lakes Engineering Works...  
.....Detroit.  
Hyde Windlass Co.....Bath, Me.  
Lockwood Mfg. Co.....  
.....East Boston, Mass.  
Milwaukee Dry Dock Co.....  
.....Milwaukee.  
Newport News Ship Building Co..  
.....Newport News, Va.  
Roelker, H. B.....New York.  
Sheriffs Mfg. Co.....Milwaukee.  
Superior Ship Building Co.....  
.....Superior, Wis.  
Thropp & Sons Co., J. E.....  
.....Trenton, N. J.  
Toledo Ship Building Co.....Toledo.  
Trout, H. G.....Buffalo.

**PROJECTORS, ELECTRIC.**

General Electric Co.....  
.....Schenectady, N. Y.

**PUMPS FOR VARIOUS PURPOSES.**

Great Lakes Engineering Works..  
.....Detroit.  
Kingsford Foundry & Machine  
Works .....Oswego, N. Y.  
Wheeler Condenser & Engineering  
Co. ....New York.

**RANGES.**

Stamford Foundry Co.....  
.....Stamford, Conn.

**REFRIGERATING APPARATUS.**

Great Lakes Engineering Works...  
.....Detroit.  
Roelker, H. B.....New York.

**REGISTER FOR CLASSIFICATION OF VESSELS.**

Great Lakes Register.....Cleveland.

**RIVETS, STEEL FOR SHIPS AND BOILERS.**

Bourne-Fuller Co.....Cleveland, O.

**RUBBER SUPPLIES.**

Republic Belting & Supply Co.....  
.....Cleveland, O.

**SAFETY VALVES.**

Lunkenheimer Co.....Cincinnati.

**SAIL MAKERS.**

Baker, Howard H. & Co....Buffalo.  
Upson-Walton Co.....Cleveland.

**SALVAGE COMPANIES.**

See Wrecking Companies.

**SEARCH LIGHTS.**

General Electric Co.....  
.....Schenectady, N. Y.

**SHEARS.**

See Punches, and Shears.

**SHIP AND BOILER PLATES AND SHAPES.**

Bourne-Fuller Co.....Cleveland, O.  
Otis Steel Co.....Cleveland.

**SHIP BUILDERS.**

American Ship Building Co.....  
.....Cleveland.  
Atlantic Works ..East Boston, Mass.  
Buffalo Dry Dock Co.....Buffalo.  
Cramp, Wm. & Sons..Philadelphia.  
Chicago Ship Building Co..Chicago.  
Detroit Ship Building Co....Detroit.  
Fore River Ship Building Co.....  
.....Quincy, Mass.  
Great Lakes Engineering Works...  
.....Detroit.  
Lockwood Mfg. Co.....  
.....East Boston, Mass.  
Manitowoc Dry Dock Co.....  
.....Manitowoc, Wis.  
Maryland Steel Co.....  
.....Sparrow's Point, Md.  
Milwaukee Dry Dock Co.....  
.....Milwaukee.  
Newport News Ship Building Co...  
.....Newport News, Va.  
New York Shipbuilding Co.....  
.....Camden, N. J.  
Roach's Ship Yard.....Chester, Pa.  
Shipowner's Dry Dock Co..Chicago.  
Toledo Ship Building Co.....Toledo.

**SHIP CHANDLERS.**

Baker, Howard H. & Co....Buffalo.  
Marine Mfg. & Supply Co.....  
.....New York.  
Upson-Walton Co.....Cleveland.

**SHIP DESIGNERS.**

Kidd, Joseph .....Duluth.  
Steel, Nacey, & Hynd....Cleveland.  
Wood, W. J.....Chicago.



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### FOR TUG BOAT USE

Easy to adjust, and can be handled by any one.

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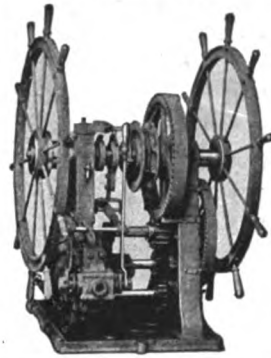
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For Tugs and Steamers. Simple, Durable, Efficient and practically noiseless. Can easily be changed to hand gear if necessary.

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Lieut Dinger, U. S. N., said: "Flake Graphite is not affected, chemically or physically, by any temperature encountered in a cylinder—pumps run better with graphite and a little kerosene than with oil."

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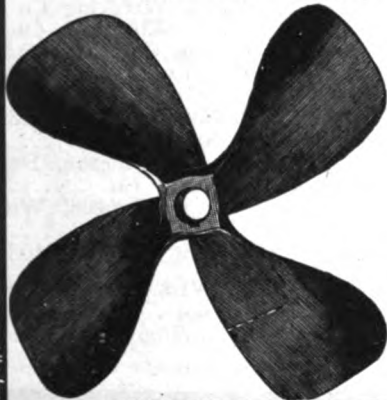
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Propeller  
Wheels.**

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BOTH HOLLOW AND SOLID,  
MADE OF BEST QUALITY DOUBLE REFINED CHARCOAL  
IRON OR STEEL.

ANY SIZE, OUTSIDE OR INSIDE DIAMETER.  
AVERAGE LENGTH OF HOLLOW BARS  
EIGHT TO TEN FEET.

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CUYAHOGA FALLS, O. U. S. A.

Makers of only the Highest Quality of Staybolt Material, in Hollow and Solid Bars, from the Best Double-Refined Charcoal Iron or Steel.

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Spun  
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FOR SALE AT SHIP CHANDLERS EVERYWHERE.

## Buyers' Directory of the Marine Trade---Continued.

**SHIP LANTERNS AND LAMPS.**  
Upson-Walton Co.....Cleveland.

**SHIP TIMBER.**  
Martin-Barriss Co.....Cleveland.

**SMOOTH-ON COMPOUND, FOR REPAIRS.**  
Smooth-On Mfg. Co.....  
.....Jersey City, N. J.

**STAYBOLT IRON OR STEEL BARS, HOLLOW OR SOLID.**  
Falls Hollow Staybolt Co.....  
.....Cuyahoga Falls, O.

**STEAM VESSELS FOR SALE.**  
Holmes, Samuel.....New York.  
McCarthy, T. R.....Montreal, Can.

**STEAMSHIP LINES, PASS, AND FREIGHT.**  
American Line.....New York.  
Anchor Line.....Buffalo.  
Boston Steamship.....Boston.  
C. & B. Transit Co.....Cleveland.  
International Mercantile Marine Co.  
.....Philadelphia.  
Mallory Line.....New York.  
New York & Cuba Mail S. S. Co..  
.....New York.  
Red Star Line.....New York.

**STEAM SPECIALTIES.**  
Robertson, Jas. L. & Sons..New York.

**STEEL CASTINGS.**  
Otis Steel Co.....Cleveland.

**STEERING APPARATUS.**  
American Ship Building Co.....  
.....Cleveland.  
Chase Machine Co.....Cleveland.  
Dake Engine Co.....  
.....Grand Haven, Mich.  
Detroit Ship Building Co.....Detroit.  
Hyde Windlass Co.....Bath, Me.  
Marine Mfg. & Supply Co.....  
.....New York.  
Sheriffs Mfg. Co.....Wilwaukee.

**SUBMARINE DIVING APPARATUS.**  
Morse & Son, A. J.....Boston.  
Schrader's Son, Inc. A....New York.

**SURVEYORS, MARINE.**  
Hynd, Alexander.....Cleveland.  
Parker Bros. Co., Ltd.....Detroit.  
Nacey, James.....Cleveland.  
Steel, Adam.....Cleveland.  
Wood, W. J.....Chicago.

**TESTS OF MATERIALS.**  
Hunt, Robert W. & Co....Chicago.  
Lunkenheimer Co....Cincinnati, O.

**THERMIT**  
Goldschmidt Thermit Co.,.....  
.....New York City.

**TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.**  
Watson-Stillman Co.....New York.

**TOOLS, WOOD WORKING.**  
Atlantic Works, Inc....Philadelphia.

**TOWING MACHINES.**  
American Ship Windlass Co.....  
.....Providence, R. I.  
Chase Machine Co.....Cleveland.

**TOWING COMPANIES.**  
Donnelly Salvage & Wrecking Co..  
.....Kingston, Ont.  
Great Lakes Towing Co..Cleveland.

**TRUCKS.**  
Boston & Lockport Block Co.....  
.....Boston.

**TUBING, SEAMLESS.**  
Shelby Steel Tube Co..Pittsburg, Pa.

**VALVES, STEAM SPECIALTIES, ETC.**  
Jenkins Bros. ....New York.  
Lunkenheimer Co.....Cincinnati.  
Ross Valve Co.....Troy, N. Y.

**VALVES FOR WATER AND GAS.**  
Ashton Valve Co.....Boston.  
Lunkenheimer Co.....Cincinnati.  
Republic Belting & Supply Co.....  
.....Cleveland, O.  
Ross Valve Co.....Troy, N. Y.

**VESSEL AND FREIGHT AGENTS.**  
Boland, John J.....Buffalo.  
Elphicke, C. W. & Co.....Chicago.  
Hall, John B.....Buffalo.  
Helm & Co., D. T.....Duluth.  
Hawgood & Co., W. A....Cleveland.  
Holmes, Samuel.....New York.  
Hutchinson & Co.....Cleveland.  
McCarthy, T. R.....Montreal.

**VESSELS AND FREIGHT AGENTS—Con.**  
Mitchell & Co.....Cleveland.  
Parker Bros. Co., Ltd.....Detroit.  
Prindiville & Co.....Chicago.  
Richardson, W. C.....Cleveland.  
Sullivan, D. & Co.....Chicago.

**WATER GAUGES.**  
Lunkenheimer Co....Cincinnati, O.

**WHISTLES, STEAM.**  
Lunkenheimer Co.....Cincinnati.

**WILFORD'S WATERPROOF CLOTH.**  
Bunker, E. A.....New York.

**WIRE ROPE AND WIRE ROPE FITTINGS.**  
Baker, H. H. & Co.....Buffalo.  
Upson-Walton Co.....Cleveland.

**WINDLASSES.**  
American Ship Windlass Co.....  
.....Providence, R. I.  
American Ship Building Co.....  
.....Cleveland.  
Dake Engine Co.....  
.....Grand Haven, Mich.  
Hyde Windlass Co.....Bath, Me.  
Marine Mfg. & Supply Co.....  
.....New York.

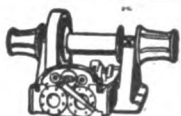
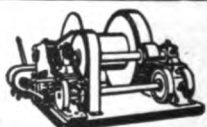
**WINCHES.**  
American Ship Windlass Co.....  
.....Providence, R. I.  
Hyde Windlass Co.....Bath, Me.

**WOOD WORKING MACHINERY.**  
Atlantic Works, Inc....Philadelphia.

**WRECKING AND SALVAGE COMPANIES.**  
Donnelly Salvage & Wrecking Co..  
.....Kingston, Ont.  
Great Lakes Towing Co..Cleveland.  
Parker Bros. Co., Ltd.....Detroit.

**YACHT AND BOAT BUILDERS.**  
Drein, Thos. & Son.....  
.....Wilmington, Del.  
Manitowoc Dry Dock Co.....  
.....Manitowoc, Wis.  
Truscott Boat Mfg. Co.....  
.....St. Joseph, Mich.

**YAWLS.**  
Drein, Thos. & Son.....  
.....Wilmington, Del.

|                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                         |
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900 Locust St., St. Lou's.  
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21 Post St., San Francisco.  
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For BRUNSWICK, GA.

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*Vessel Agent.*  
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Telephone, Seneca 892.  
BUFFALO, N. Y.

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W. A. HAWGOOD & CO.  
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Res. A. H. Hawgood, Doan 841-J.

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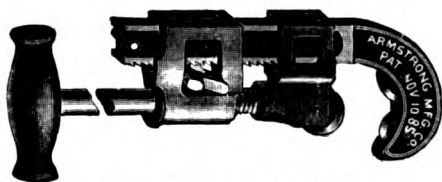


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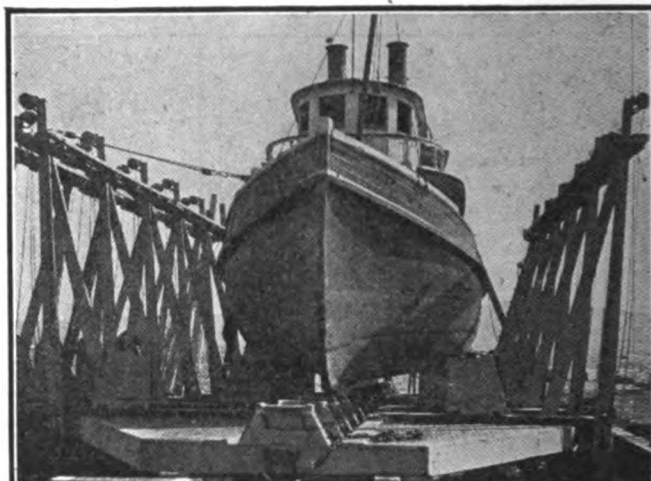
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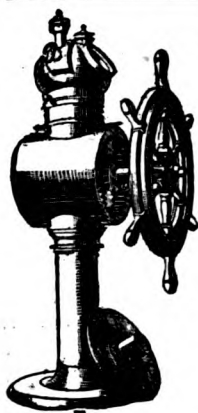
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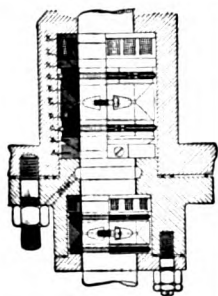
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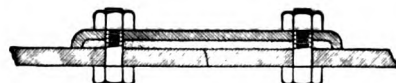


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